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Environmental Assessment of NH3 Injection for an Industrial Package Boiler. Volume 2. Data Supplement

Acurex Corp., Mountain View, CA

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ENVIRONMENTAL ASSESSMENT OF NH_3 INJECTION FOR AN INDUSTRIAL PACKAGE BOILER

Volume II
Data Supplement

by
C. Castaldini, R. DeRosier, and L. R. Waterland
Acurex Corporation
Energy & Environmental Division
555 Clyde Avenue
P.O. Box 7555
Mountain View, California 94039

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EPA Project Officer: R. E. Hall
Air and Energy Engineering Research Laboratory
Research Triangle Park, North Carolina 27711

AIR AND ENERGY ENGINEERING RESEARCH LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

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16. ABSTRACT
The report discusses emission results from comprehensive flue gas sampling of a gas- and oil-fired industrial boiler equipped with Exxon's Thermal DeNOx Ammonia Injection Process for NOx reduction. Comprehensive emission measurements included continuous monitoring of flue gas emissions; source assessment sampling system (SASS) tests; EPA Method 5/17 for solid and condensible particulate emissions and ammonia emissions; controlled condensation system for SO2 and SO3; and N2O emission sampling. Ammonia injection at a NH3/NO molar ratio of 2.52 gave a NOx reduction of 41% from an uncontrolled level of 234 ppm to a controlled level of 137 ppm. NH3 emissions increased from 11 ppm for the baseline to an average of 430 ppm for ammonia injection. Nitrous oxide, N2O, was reduced 68% from a 50 ppm baseline level to a 17 ppm controlled level. Total particulate emissions increased by an order of magnitude from a baseline of 17.7 ng/J to a controlled level of 182 ng/J. This increase is in part attributed to formation of ammonia sulfate and bisulfate from residual ammonia and SOx. Total organic emissions were at a moderate level and showed a relative concentration in the nonvolatile category. Organic emissions of CO and trace inorganic elements were not significantly affected by ammonia injection.

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Pollution	Residual Oils	Pollution Control	13B	
Nitrogen Oxides	Sampling	Stationary Sources	07B	14B
Ammonia		Package Boilers		
Flue Gases		Industrial Boilers	21B	
Boilers		Thermal DeNOx	13A	
Natural Gas			21D	

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Howard B. Mason
Manager, Energy Engineering Department
Acurex Corporation
485 Clyde Avenue
P. O. Box 7044
Mountain View, CA 94039
Phone: (415) 961-5700

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SECTION 1

INTRODUCTION

The purpose of this data supplement is to document data in greater detail than was practical in Volume I (Technical Results) of this report. It is intended to provide sufficient detail for researchers to perform their own analysis of the data obtained. Readers are referred to the technical volume for objectives, description of the source, emission results, interpretation and conclusions.

The remaining sections of this data supplement contain the following information:

2 -- Preliminary Equipment Calibration and Tests. Calibration data for the dry gas meters used to sample exhaust gas with the Source Assessment Sampling System (SASS) train.

3 -- Boiler Operating Data. Field data sheets of boiler operating conditions from available test meters. Boiler thermal efficiency calculations and operation and problems encountered during injection of NH_3/H_2 as NO_x control technology are also given.

4 -- Sampling Data Sheets. Emission data obtained with continuous monitoring instrumentation. Operating data tables for EPA Method 5/17 (for particulate mass emissions), controlled condensation (for SO_2 and SO_3 sampling) and SASS (for particulate, trace element and organic sampling).

5 -- Analytical Laboratory Results. Laboratory analysis reports on particulate emissions by gravimetric analysis; sulfur emissions by turbimetric analysis; trace element emissions by Spark Source Mass Spectrometry (SSMS) and Atomic Absorption Spectroscopy (AAS) analyses; total chromatographable organic and gravimetry results (Chromatograms for C_1-C_6 hydrocarbon included); determination of organic compounds by Gas Chromatography/Mass Spectrometry (GC/MS) (chromatograms of compounds included); infrared (IR) spectra of total sample extracts; Liquid Chromatography (LC) separation, with IR and Low Resolution Mass Spectrometry (LRMS) of selected fractions; radiometric analysis results and biological assay reports for flue gas samples for both baseline and NH_3 injection tests.

SECTION 2

PRELIMINARY EQUIPMENT CALIBRATION

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Date 3/18/82
Time 9:15
Barometric Pressure 29.75
Ambient Temperature 65 °F

Orifice Meter
Orifice Magnehelic 90 216DW153
Primary Calibration Meter 433583.
Control Module #69

Operators STEA d
Wet Bulb Temperature

METER CALIBRATION DATA

	Orifice Manometer ΔH_{ref} (in.wg.)	Orifice Magnehelic ΔH_O (in.wg.)	Primary Meter ΔH_p (in.wg.)	Dry Test Meter P_{dg} (in. wg.)	Gas Volume Primary Meter V_p (ft.³)	Gas Volume Dry Test Meter V_d (ft.³)	Temperature						Time θ (min.)	[illegible]	K_o	
							Primary Meter			Dry Test Meter						
							Inlet, T_{pi} (°F)	Outlet, T_{po} (°F)	Avg., T_{pa} (°F)	Inlet, T_{di} (°F)	Outlet, T_{do} (°F)	Avg., T_{da} (°F)				
Small orifice		.4			038.598 063.906	725.897 751.207	70 68	69 68	68.25	65 68	65 68	66.5	77			Ko=.665 d=1.009
		0.4			25.308	25.310										
		0.6														
		1.0			063.906 084.495	751.207 771.804	68 71	68 68	68.75	68 68	68 69	68.25	37			Ko=.711 d=1.004
		1.0			20.589	20.597										
		1.2														
		1.6			084.495 114.200	771.804 801.519	71 74	68 71	71	69 69	69 70	69.25	42			Ko=.713 d=1.007
		1.6			29.705	29.715										
		1.8														
		2.2			114.200 149.935	801.519 837.225	74 76	70 71	72.75	69 69	70 69	69.25	43			Ko=.715 d=1.016
		2.2			35.735	35.706										
		2.4														
Large orifice		.4			149.935 190.698	837.225 877.896	77 97	70 74	78.25	69 69	69 69	69	23			Ko=3.576 d=1.016
		2.8			40.763	40.671										
		3.0														
		1.0			190.698	877.896	94 106	75 83	89.5	70 73	69 71	70.75	29			Ko=3.534 d=1.028
		3.4			271.148	957.633										
		3.6			80.450	79.737										
		1.6			271.148 343.497	957.633 029.281	101 111	83 89	96	75 76	71 72	73.5	21			Ko=3.461 d=1.035
		4.0			72.349	71.648										
		4.2														
		2.2			343.497 452.386	029.281 139.186	106 112	87 92	99.25	76 79	72 74	75.25	27			Ko=3.450 d=1.059
		4.6			108.889	109.905										
		4.8														
		5.0														

Average

	Small orifice	Large orifice
Ave	Ko = .701	Ko = 3.505
	d = 1.008	d = 1.035

Date 7-15-81
Time 12:26
Barometric Pressure 29.72
Ambient Temperature 73° F

Orifice Meter
Orifice Magnehelic 81107WW27
Primary Calibration Meter 433583
Control Module 520-084
orifice plate # 084

Operators Seegmiller
Wet Bulb Temperature

METER CALIBRATION DATA

	Orifice Manometer ΔH_{ref} (in. wg.)	Orifice Magnehelic ΔH_D (in. wg.)	Primary Meter ΔP_p (in. wg.)	Dry Test Meter P_{dg} (in. wg.)	Gas Volume Primary Meter V_p (ft.³)	Gas Volume Dry Test Meter V_d (ft.³)	Temperature: Primary Meter Inlet, T_{pi} (°F)	Primary Meter Outlet, T_{po} (°F)	Primary Meter Avg., T_{pm} (°F)	Dry Test Meter Inlet, T_{di} (°F)	Dry Test Meter Outlet, T_{do} (°F)	Dry Test Meter Avg., T_{dm} (°F)	Time t (min.)	α	K_o	
Small	.60	.6			105.358 085.088	278.307 258.509	83 103	77 78	85.25	78 78	79 78	78.25	46.4	1.001	.713	α avg.-
					20.270	19.998										1.011
.187	1.63	1.6			125.438 105.358	298.567 278.507	82 83	78 78	80.25	78 78	79 79	78.5	28.6	1.006	.695	
					20.080	20.060										Ko avg.
	2.66	2.6			145.417 125.438	318.592 298.567	88 85	78 78	82.25	79 78	79 79	78.75	22.5	1.015	.688	
					19.979	20.025										.693
	3.65	3.6			165.378 145.417	338.609 318.592	91 88	78 78	83.75	79 79	79 79	79	19.5	1.021	.677	
					19.961	20.017										
Medium	.60	.6			190.308 165.378	363.634 338.609	86 89	78 79	83.0	79 79	80 80	79.5	23.6	1.012	1.723	
					24.930	25.025										α avg.-
	1.62	1.6			210.148 190.308	383.637 363.634	100 92	78 78	87.0	79 79	80 80	79.5	11.8	1.026	1.669	1.029
					19.840	20.003										
.281	2.65	2.6			238.872 210.148	412.644 383.637	93 101	79 78	87.75	79 79	80 80	79.5	13.5	1.032	1.651	Ko avg.-
					28.724	29.007										
	3.63	3.6			258.673 238.872	432.662 412.644	110 106	78 79	93.25	79 79	80 80	79.5	8.0	1.046	1.641	1.671
					19.801	20.018										
Large	.59	.6			278.548 258.673	452.663 432.662	109 104	79 79	92.75	79 78	78 80	79.0	8.9	1.034	3.674	
					19.875	20.001										α avg.-
	1.62	1.6			300.375 278.548	475.062 452.663	114 112	79 79	92.75	78 79	79 80	79.0	6.3	1.057	3.440	1.073
					21.827	22.399										
	2.64	2.6			320.525 300.375	496.059 475.062	123 118	79 79	99.75	79 79	79 79	79.0	4.7	1.09[illegible]	3.334	Ko avg.-
.358					20.150	20.997										
	3.67	3.6			339.794 320.525	516.477 496.059	126 122	79 79	101.5	79 79	79 79	79.0	4.0	1.114	3.178	3.406
					19.269	20.418										
														Average		

SECTION 3

BOILER OPERATING DATA

3.1 CONTROL ROOM BOARD AND BOILER DATA

3.2 BOILER THERMAL EFFICIENCY CALCULATION

3.1 CONTROL ROOM BOARD AND BOILER DATA

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CONTROL ROOM BOILER DATA - NORTH STEAM PLANT
BOILER 1 - 81-N1

DATE : 8-11-81
TEST : BASELINE (1 OF 2)

	10:30	11:00	12:00	1:00	2.00
Steam Flow, 10^3 lb/hr	32.0	32.0	32.0	32.0	32.1
Drum Pressure, psig	270	270	270	270	270
Superheater Temperature, °F	495	495	495	495	495.
Superheater Steam Pressure, psig	250	250	250	251	250
Windbox pressure, in H_2O	3.2	3.3	3.3	3.3	3.3
Furnace Pressure, in H_2O	1.3	1.3	1.3	1.4	1.4
Boiler Outlet Pressure, in H_2O	0.3	0.25	0.3	0,35	0.3
Oil Pressure @ Burner, psig	42	42	42	42	42
Atomizing Steam Pressure, psig	61	61	62	62	62
Oil Temperature, °F	200	200	200	200	200
Refinery Gas Pressure, psig	2.5	2.5	2.5	2.5	2.5
Refinery Gas Flow, 10^3 scfh	22.74	22.40	22.3	22.34	22.22
Refinery Gas Heat Input, 10^6 Btu/hr	19.9	20	20	20.0	20.0
Fuel Oil Flow, B/d	98.84	99.91	99.8	100.09	100.10
Fuel Oil Heat Input, 10^6 Btu/hr	24.4	25.1	24.3	24.7	24.2
Combustion Air Flow, 10^3 scfh	516	516	516	516	516
Refinery Gas S.G.	0.491	0.491	0.491	0.498	0.498
Refinery Gas H_2S, gr/scf(d)	0.012	0.012	0.012	0.014	0.012
Fuel Oil Sulfur, percent	0.5	0.5	0.5	0.5	0.5
NH_3 flowrate, lb/hr	-	-	-	-	-
H_2 Flowrate, lb/hr	-	-	-	-	-
NH_3 Manifold Pressure, psig	-	-	-	-	-
Carrier Steam Flowrate, lb/hr					
Carrier Steam Pressure, psig					
Plant Meter NO_x, ppm	245-250	240	255	250	250
Plant Meter NO_x, lb/hr					13.93
Plant Meter SO_2, ppm					
Plant Meter CO_2, lb/hr					
Plant Meter O_2, percent	2.5	2.4	2.45	2.45	2.35
COMMENTS Baseline test performed over two days (11th and 12th of August)	Start of MS and NH_3 sampling tests			MS and two NH_3 tests were concluded at 1:30 pm	Increase in CO to 100 ppm at 1:50 pm No visible impact in boiler operation

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CONTROL ROOM BOILER DATA - NORTH STEAM PLANT
BOILER 1 - 81-N1

DATE : 8-11-81
TEST : BASELINE (1 of 2)

	3.00	4.00	5.0	6.00	7.00
Steam Flow, 10^3 lb/hr	32.2	32.2	32.2	32.0	31.9
Drum Pressure, psig	270.0	270.0	270.0	270.0	270.0
Superheater Temperature, °F	495.0	495.0	495.0	495.0	495.0
Superheater Steam Pressure, psig	251.0	249.0	251.0	250.0	251.0
Windbox pressure, in H_2O	3.3	3.2	3.3	3.4	3.3
Furnace Pressure, in H_2O	1.4	1.3	1.4	1.5	1.4
Boiler Outlet Pressure, in H_2O	0.3	0.25	0.3	0.35	0.3
Oil Pressure @ Burner, psig	42.0	42.0	43.0	42.0	42.0
Atomizing Steam Pressure, psig	62.0	63.0	62.0	62.0	62.0
Oil Temperature, °F	200.0	200.0	200.0	200.0	200.0
Refinery Gas Pressure, psig	2.5	2.5	2.5	2.6	2.5
Refinery Gas Flow, 10^3 scfh			21.76	21.42	21.58
Refinery Gas Heat Input, 10^6 Btu/hr	20.1	20.0	19.98	20.04	20.03
Fuel Oil Flow, B/d			100.25	99.87	100.05
Fuel Oil Heat Input, 10^6 Btu/hr	24.8	24.9	25.6	26.56	25.61
Combustion Air Flow, 10^3 scfh	516.0	516.0	516.0	516.0	516.0
Refinery Gas S.G.	0.502	0.507	0.495	0.492	0.496
Refinery Gas H_2S, gr/scf(d)	0.017	0.016	0.014	0.015	0.016
Fuel Oil Sulfur, percent	0.5	0.6	0.5	0.5	0.5
NH_3 flowrate, lb/hr	-	-	-	-	-
H_2 Flowrate, lb/hr	-	-	-	-	-
NH_3 Manifold Pressure, psig	-	-	-	-	-
Carrier Steam Flowrate, lb/hr					
Carrier Steam Pressure, psig					
Plant Meter NO_x, ppm	250	250		250	255
Plant Meter NO_x, lb/hr			13.99		
Plant Meter SO_2, ppm					
Plant Meter SO_2, lb/hr					
Plant Meter O_2, percent	2.5	2.5	2.5	2.5	2.5
COMMENTS	O_2 and CO readings back to normal of about 2.7 % and 40 ppm as averages				

CONTROL ROOM BOILER DATA - NORTH STEAM PLANT
BOILER 1 - 81-N1

DATE : 8-11-81
TEST : BASELINE (1 of 2)

	8:00				
Steam Flow, 10^3 lb/hr	31.8				
Drum Pressure, psig	270.0				
Superheater Temperature, °F	495.0				
Superheater Steam Pressure, psig	250.0				
Windbox pressure, in H_2O	3.3				
Furnace Pressure, in H_2O	1.5				
Boiler Outlet Pressure, in H_2O	0.3				
Oil Pressure @ Burner, psig	142.0				
Atomizing Steam Pressure, psig	61.0				
Oil Temperature, °F	200.0				
Refinery Gas Pressure, psig	2.5				
Refinery Gas Flow, 10^3 scfh	21.71				
Refinery Gas Heat Input, 10^6 Btu/hr	19.92				
Fuel Oil Flow, B/d	99.99				
Fuel Oil Heat Input, 10^6 Btu/hr	25.59				
Combustion Air Flow, 10^3 scfh	516.0				
Refinery Gas S.G.	0.4496				
Refinery Gas H_2S, gr/scf(d)	0.017				
Fuel Oil Sulfur, percent	0.6				
NH_3 flowrate, lb/hr	–				
H_2 Flowrate, lb/hr	–				
NH_3 Manifold Pressure, psig	–				
Carrier Steam Flowrate, lb/hr					
Carrier Steam Pressure, psig					
Plant Meter NO_x, ppm	253				
Plant Meter NO_x, lb/hr					
Plant Meter SO_2, ppm					
Plant Meter SO_2, lb/hr					
Plant Meter O_2, percent	2.45				
COMMENTS	Completed three NH_3 tests, one HS test, one controlled condensation test, and two C_1-C_6 tests	SASS and other C_1-C_6 tests scheduled for 2/2 baseline day on 8-12-83			

CONTROL ROOM BOILER DATA - NORTH STEAM PLANT
BOILER 1 - 81-N1

DATE : 8-12-81
TEST : BASELINE (2 OF 2)

	12.50	2.00	3.00	4.00	5.00
Steam Flow, 10^3 lb/hr					32.1
Drum Pressure, psig	270.0	270.0	270.0	270.0	270.0
Superheater Temperature, °F	495.0	496.0	495.0	495.0	495.0
Superheater Steam Pressure, psig	251.0	260.0	250.0	250.0	250.0
Windbox pressure, in H_2O	3.3	3.3	3.5	3.4	3.5
Furnace Pressure, in H_2O	1.4	1.5	1.5	1.65	1.5
Boiler Outlet Pressure, in H_2O	0.3	0.3	0.3	0.35	0.35
Oil Pressure @ Burner, psig	48.0	48.0	48.0	49.0	48.0
Atomizing Steam Pressure, psig	70.0	71.0	78.0	72.0	72.0
Oil Temperature, °F	196.0	196.0	196.0	196.0	196.0
Refinery Gas Pressure, psig	2.5	2.5	2.5	2.5	2.5
Refinery Gas Flow, 10^3 scfh	–	–	–	20.28	19.41
Refinery Gas Heat Input, 10^6 Btu/hr	20.1	20.0	20.0	20.01	20.09
Fuel Oil Flow, B/d	–	–	–	99.67	99.35
Fuel Oil Heat Input, 10^6 Btu/hr	24.9	25.0	25.2	25.51	25.43
Combustion Air Flow, 10^3 scfh	515.0	512.0	525.0	514.0	515.0
Refinery Gas S.G.	0.549	0.577	0.574	0.544	0.572
Refinery Gas H_2S, gr/scf(d)	0.011	0.018	0.020	0.018	0.021
Fuel Oil Sulfur, percent	0.5	0.5	0.6	0.5	0.5
NH_3 flowrate, lb/hr	–	–	–	–	–
H_2 Flowrate, lb/hr	–	–	–	–	–
NH_3 Manifold Pressure, psig	–	–	–	–	–
Carrier Steam Flowrate, lb/hr					
Carrier Steam Pressure, psig					
Plant Meter NO_x, ppm	232/245	234/245	245/230/242	245	250
Plant Meter NO_x, lb/hr				12.40	
Plant Meter SO_2, ppm					
Plant Meter SO_2, lb/hr				13.84	13.88
Plant Meter O_2, percent	2.6-3.0	2.75	2.65	2.65	2.6
COMMENTS Baseline test performed over two days (11th and 12th of August)		SASS test started at 2:20 pm	Fuel oil sample taken		

CONTROL ROOM BOILER DATA - NORTH STEAM PLANT
BOILER 1 - 81-N1

DATE : 8-12-81
TEST : BASELINE (2012)

	6.00	7.00	8.00	9.00	
Steam Flow, 10^3 lb/hr	32.1	32.0	31.9	31.9	
Drum Pressure, psig	270.0	270.0	270.0	271.0	
Superheater Temperature, °F	495.0	495.0	495.0	495.0	
Superheater Steam Pressure, psig	250.0	251.0	250.0	251.0	
Windbox pressure, in H_2O	3.4	3.4	3.5	3.4	
Furnace Pressure, in H_2O	1.5	1.5	1.5	1.5	
Boiler Outlet Pressure, in H_2O	0.35	0.35	0.35	0.35	
Oil Pressure @ Burner, psig	48.0	50.0	50.0	48.0	
Atomizing Steam Pressure, psig	71.0	71.0	71.0	71.0	
Oil Temperature, °F	196.0	198.0	198.0	198.0	
Refinery Gas Pressure, psig	2.5	2.5	2.5	2.4	
Refinery Gas Flow, 10^3 scfh	20.7	20.22	20.82	20.78	
Refinery Gas Heat Input, 10^6 Btu/hr	20.04	20.03	20.02	20.00	
Fuel Oil Flow, B/d	99.68	99.75	99.89	99.91	
Fuel Oil Heat Input, 10^6 Btu/hr	25.51	25.53	25.56	25.58	
Combustion Air Flow, 10^3 scfh	520.0	517.0	514.0	520.0	
Refinery Gas S.G.	0.574	0.550	0.549	0.561	
Refinery Gas H_2S, gr/scf(d)	0.022	0.021	0.020	0.016	
Fuel Oil Sulfur, percent	0.5	0.5	0.5	0.5	
NH_3 flowrate, lb/hr	–	–	–	–	
H_2 Flowrate, lb/hr	–	–	–	–	
NH_3 Manifold Pressure, psig	–	–	–	–	
Carrier Steam Flowrate, lb/hr					
Carrier Steam Pressure, psig					
Plant Meter NO_x, ppm	260.0	246	246	250	
Plant Meter NO_x, lb/hr		12.88	12.51	12.84	
Plant Meter SO_2, ppm					
Plant Meter SO_2, lb/hr	13.88	13.94	13.94	13.92	
Plant Meter O_2, percent	2.6	2.65	2.8	2.85	
COMMENTS		Last C_1-C_6 gas sample taken at 7 pm		End of SASS test at 8:45 pm	

CONTROL ROOM BOILER DATA - NORTH STEAM PLANT
BOILER 1 - 81-N1

DATE : 8-13-81
TEST : LOW-NOX (1 of 1)

	12:00	1:00	2:00	3:00	4:00
Steam Flow, 10^3 lb/hr	31.7	31.7	31.7	31.8	31.8
Drum Pressure, psig	270.0	269.0	270.0	270.0	270.0
Superheater Temperature, °F	496.0	495.0	495.0	495.0	495.0
Superheater Steam Pressure, psig	250.0	249.0	250.0	250.0	250.0
Windbox pressure, in H_2O	3.4	3.5	3.5	3.5	3.5
Furnace Pressure, in H_2O	1.5	1.5	1.5	1.6	1.6
Boiler Outlet Pressure, in H_2O	0.35	0.35	0.35	0.35	0.35
Oil Pressure @ Burner, psig	42.0	42.0	42.0	42.0	42.0
Atomizing Steam Pressure, psig	62.0	62.0	61.0	62.0	62.0
Oil Temperature, °F	200.0	200.0	200.0	200.0	200.0
Refinery Gas Pressure, psig	2.5	2.5	2.5	2.5	2.5
Refinery Gas Flow, 10^3 scfh	21.29	21.22	21.24	21.01	21.49
Refinery Gas Heat Input, 10^6 Btu/hr	19.99	20.0	19.98	19.99	20.02
Fuel Oil Flow, B/d	99.91	99.89	100.07	99.72	99.86
Fuel Oil Heat Input, 10^6 Btu/hr	25.57	25.56	25.61	25.52	25.56
Combustion Air Flow, 10^3 scfh	514.0	514.0	512.0	513.0	513.0
Refinery Gas S.G.	0.516	0.520	0.518	0.520	0.521
Refinery Gas H_2S, gr/scf(d)	0.015	0.014	0.015	0.016	0.016
Fuel Oil Sulfur, percent	0.5	0.5	0.5	0.5	0.5
NH_3 flowrate, lb/hr	12.2	12.2	12.2	12.0	12.0
H_2 Flowrate, lb/hr	-	-	-	-	-
NH_3 Manifold Pressure, psig	> 150 ~ 250	~ 250.0	~ 250.0	> 260.0	> 260.0
Carrier Steam Flowrate, lb/hr	850.0	860.0	740.0	840.0	840.0
Carrier Steam Pressure, psig	59.0	59.5	60.0	60.0	60.0
Plant Meter NO_x, ppm	138.0	136.0	140 - 182	138.0	147.0
Plant Meter NO_x, lb/hr	13.26	-	13.27	13.25	13.27
Plant Meter SO_2, ppm					
Plant Meter SO_2, lb/hr	13.92	13.94	13.95	13.89	13.93
Plant Meter O_2, percent	2.58	2.61	2.6	2.6	2.75
COMMENTS	Start of SASS at about 11:45. Acurex CM van reports NOx at about 160 ppm versus plant NOx meter of 140 ppm		Increase in NOx to 182 ppm caused by NH_3 drop from 12 to 6 lb/hr. Adjustment to 12 lb/hr was made immediately.		NH_3 flowrate dropped to 10.5 lb/hr. Correction to 12 lb/hr done immediately

CONTROL ROOM BOILER DATA - NORTH STEAM PLANT
BOILER 1 - 81-N1

DATE : 8-13-81

TEST : LOW-NOx (1 OF 1)

	5:00	6:00	7:00	8:00	9:00
Steam Flow, 10^3 lb/hr	31.8	31.8	31.8	31.8	31.7
Drum Pressure, psig	270.0	270.0	270.0	270.0	270.0
Superheater Temperature, °F	495.0	495.0	495.0	495.0	495.0
Superheater Steam Pressure, psig	250.0	250.0	250.0	250.0	251.0
Windbox pressure, in H_2O	3.4	3.6	3.5	3.55	3.5
Furnace Pressure, in H_2O	1.6	1.6	1.6	1.6	1.6
Boiler Outlet Pressure, in H_2O	0.35	0.40	0.4	0.38	0.4
Oil Pressure @ Burner, psig	42.0	42.0	40.0	40.2	42.0
Atomizing Steam Pressure, psig	62.0	62.0	62.0	62.0	62.0
Oil Temperature, °F	200.0	200.0	200.0	200.0	200.0
Refinery Gas Pressure, psig	2.5	2.5	2.5	2.5	2.5
Refinery Gas Flow, 10^3 scfh	21.32	21.15	21.30	20.63	20.84
Refinery Gas Heat Input, 10^6 Btu/hr	20.0	19.95	20.0	20.02	19.96
Fuel Oil Flow, B/d	100.07	100.01	100.12	100.13	100.06
Fuel Oil Heat Input, 10^6 Btu/hr	25.61	25.59	25.62	25.63	25.61
Combustion Air Flow, 10^3 scfh	516.0	514.0	517.0	515.0	518.0
Refinery Gas S.G.	0.513	0.514	0.515	0.523	0.527
Refinery Gas H_2S, gr/scf(d)	0.016	0.015	0.015	0.013	0.013
Fuel Oil Sulfur, percent	0.5	0.5	0.5	0.5	0.5
NH_3 flowrate, lb/hr	12.0	12.0	12.1	12.3	12.2
H_2 Flowrate, lb/hr	–	–	–	–	0
NH_3 Manifold Pressure, psig	>250.0	>250.0	>250.0	>250.0	>250.0
Carrier Steam Flowrate, lb/hr	840.0	835.0	840.0	840.0	840.0
Carrier Steam Pressure, psig	60.0	59.0	59.0	59.0	59.5
Plant Meter NO_x, ppm	142.0	156.0	150.0	148.0	140.0
Plant Meter NO_x, lb/hr	13.27		13.28	13.30	13.27
Plant Meter SO_2, ppm					
Plant Meter SO_2, lb/hr	13.95		13.95	13.95	13.93
Plant Meter O_2, percent	2.6	2.65	2.62	2.7	2.9
COMMENTS	Generally NH_3 flowrate not steady. Requires constant attention			NH_3 flowrate dropped to 11 lb/hr Adjustment to 12 lb/hr setting made immediately	O_2 reading increasing because of colder temperatures.

CONTROL ROOM BOILER DATA - NORTH STEAM PLANT
BOILER 1 - 81-N1

DATE : 8-13-81

TEST : LOW-NOX (1 OF 1)

	10.00				
Steam Flow, 10^3 lb/hr	31.5				
Drum Pressure, psig	270.0				
Superheater Temperature, °F	495.0				
Superheater Steam Pressure, psig	250.0				
Windbox pressure, in H_2O	3.4				
Furnace Pressure, in H_2O	1.5				
Boiler Outlet Pressure, in H_2O	0.35				
Oil Pressure @ Burner, psig	40.0				
Atomizing Steam Pressure, psig	42.0				
Oil Temperature, °F	200.0				
Refinery Gas Pressure, psig	8.5				
Refinery Gas Flow, 10^3 scfh	21.7				
Refinery Gas Heat Input, 10^6 Btu/hr	19.97				
Fuel Oil Flow, B/d	99.99				
Fuel Oil Heat Input, 10^6 Btu/hr	25.59				
Combustion Air Flow, 10^3 scfh	508.0				
Refinery Gas S.G.	0.528				
Refinery Gas H_2S, gr/scf(d)	0.012				
Fuel Oil Sulfur, percent	0.5				
NH_3 flowrate, lb/hr	12.2				
H_2 Flowrate, lb/hr	–				
NH_3 Manifold Pressure, psig	>250.0				
Carrier Steam Flowrate, lb/hr	840.0				
Carrier Steam Pressure, psig	59.5				
Plant Meter NO_x, ppm	NA				
Plant Meter NO_x, lb/hr	13.26				
Plant Meter SO_2, ppm					
Plant Meter SO_2, lb/hr	13.91				
Plant Meter O_2, percent	3.0				
COMMENTS					

AND MARKETING CO
BAKERSFIELD REFINERY
DAILY EMISSIONS REPORT (HOURLY AVERAGE)
NORTH PLANT
AUGUST 12, 1981 11:56

TIME	FUEL BURNED FUEL GAS H2S Gr/dscf	MSCFH	MMBtu/Hr	FUEL OIL Wt %S	B/D	MMBtu/Hr	TOTAL MMBtu/Hr	EMISSIONS(LB/HR) NO2 firebox	NO2 stack	SO2	part	O2 %	INCIN SO2 ppm	WIND Speed mph	From
12:00	0.012	293.35	261.13	0.50	235.37	60 24	321.37	41.84	41.01	33.58	4.73	3 85	4391.	3.7	W
13:00	0.014	293.20	263.29	0.50	235.27	60.21	323.50	42 03	42.77	33.66	4 75	3.61	4263	4.2	WSW
14:00	0.012	294.45	264.70	0.50	235.60	60.29	325 00	42.18	39.24	33 61	4.77	3.67	5014.	3.3	WNW
15:00	0.017	290.69	259.41	0 48	232 83	59.52	318.94	41.46	48.60	32.22	4.60	3.50	5.	3.8	WNW
16:00	0.016	282.69	263.73	0.50	220.85	56 52	320.25	40.95	29 57	31.84	4.59	3.61	3756.	3.2	W
17:00	0.014	269 86	243.27	0.50	210.97	53.99	297.26	38.34	28.60	30.21	4.30	3.80	4047.	3.2	WSW
18 00	0.015	295.21	269.03	0.50	226.62	58.00	327.02	41.88	31.23	32.61	4 69	3 55	4071.	3.8	W
19:00	0.016	290.83	266.23	0.50	228.48	58.47	324.70	41.78	32.28	32 87	4.68	3.60	3948.	3.7	WSW
20:00	0.017	292.05	267.53	0.50	228.28	58.42	325 95	41.87	35 62	32.91	4.69	3.78	4083.	4.4	WSW
21:00	0.016	294.96	268.71	0.50	243.18	62.23	330.94	43.13	44.15	34 92	4.85	3.76	4104.	4.6	WSW
22:00	0.013	296.50	264.00	0.48	234.03	60.34	324.34	42.11	37.89	33.32	4 74	4.01	4046.	5.5	W
23:00	0.011	299.46	263.09	0 48	234.57	59.97	323.05	41.92	36 65	32.02	4.72	4.05	3489.	3.5	W
0:00	0.011	296.51	262.05	0 48	233.79	59 77	321.82	41.78	35.92	31.86	4.68	4.10	2445.	3.9	W
1 00	0.012	296.44	259 60	0 48	231.45	59.17	318.77	41.37	34.68	31.68	4.63	4.14	1319.	2.9	NNW
2:00	0.011	296.74	259.93	0.48	230.14	58.84	318.77	41.30	34.05	31.45	4 61	4.16	669.	6.3	NNE
3:00	0.012	299.41	262.33	0.48	229 85	58.76	321.09	41.50	33 27	31.43	4.65	4.15	872.	5.6	N
4:00	0.012	297.90	259.78	0.48	227.01	58.04	317.82	41.05	32.61	31.04	4.58	4.19	200.	5.8	N
5:00	0.012	299.28	263.39	0.48	225.19	57.57	320 96	41.23	32.37	30.85	4.60	4.08	86.	2.6	NW
6:00	0.012	297.68	261.42	0.48	225.24	57.58	319.01	41.05	32.17	30.87	4.58	4 15	11.	2.1	WSW
7:00	0.012	281.98	244.41	0 48	242.98	62.12	306 53	40.88	31.51	33.14	4.45	4.29	0.	2.4	NW
8:00	0.013	280.67	247.48	0.48	243.61	62 02	309 50	41 13	30.82	33.14	4.55	4.13	201	3.4	NNW
9:00	0.017	262.99	269.24	0.50	264.39	67.66	336.91	44.77	43.47	37.88	5.06	5.59	271.	1.1	E
10:00	0.018	271.40	277.05	0.50	273.18	69.81	346.96	46.15	71.64	39.18	5.23	5.02	78.	2.8	NW
11:00	0.021	276 09	283.58	0.50	269.79	69.04	352 62	46.47	46.95	38.93	5 27	4.31	0.	3.0	W
AVERAGE	0.014	290.15	262.68	0.49	235.89	60.36	323.05	42.01	37.79	33.09	4.71	4.04	2140.	2.6	WNW
TOTAL REFINERY AVERAGE	0.014	321 19	290.83	0.49	236.84	60.58	354.94	49.24	45.03	33.21	6.03				

(8-11-81)
BASELINE TEST

GETTY REFINING AND MARKETING CO.
BAKERSFIELD REFINERY
DAILY EMISSIONS REPORT (HOURLY AVERAGE)
NORTH PLANT
AUGUST 13, 1981 9:35

TIME	FUEL BURNED							EMISSIONS(LB/HR)						WIND	
	FUEL GAS			FUEL OIL			TOTAL	NO2	NO2	SO2	part	O2	INCIN SO2	Speed	From
	H2S Gr/dscf	MSCFH	MMBtu/Hr	Wt %S	B/D	MMBtu/Hr	MMBtu/Hr	firebox	stack			%	ppm	mph	
10:00	0.018	275.60	277.05	0.50	273.18	69.91	346.96	46.15	71.64	39.18	5.23	5 02	78.	2 8	NW
11:00	0.021	276.09	283.58	0.50	269 79	69.04	352.62	46 47	46 95	38.93	5.27	4.31	0.	3.0	W
12:00	0 016	274.56	278.91	0 50	267.69	68.51	347.42	45.89	47.79	38.24	5 21	4.50	0.	3.1	WNW
13:00	0.011	276.10	266.31	0.50	265.53	67.95	334 26	44 58	46 21	37.63	5.09	4.43	0	3.6	WNW
14:00	0.018	277.36	282.83	0.50	263.54	67.45	350.27	45.93	46.50	37.83	5.21	4.36	2325.	3.4	NW
15:00	0.020	274.92	275.93	0.50	259.93	66.52	342 45	45.02	45 62	37.49	5.12	4.37	4278.	3.6	WNW
16:00	0.018	277.35	267.15	0.50	254.32	65.09	332 23	43.80	44 34	36.56	4 99	4.30	2326.	3.5	WNW
17:00	0 021	282.42	285.25	0 50	245.93	62.94	348.19	44.79	41.89	35.66	5.05	4.06	1015.	5.1	W
18:00	0.022	275.98	276.59	0.50	244 38	62.54	339.14	43.86	42 47	35 51	4 95	4.40	2630.	5 2	W
19:00	0.021	280.11	271.87	[illegible]	[illegible]	63.79	335.66	43 79	43.82	36.07	4.99	4.37	2827.	4.3	W
20:00	0.020	280.41	271.07	[illegible]	[illegible]	64.87	335.95	44.08	43.61	36 63	5.04	4.28	441.	4.8	WSW
21:00	0.016	277.86	274.78	[illegible]	[illegible]	64.24	338.99	44.12	44.76	36.00	5.03	[illegible]	104.	4.8	W
22 00	0.014	274.57	277.65	0.50	251.71	64.42	342.07	44 43	45.22	35.91	5.06	4.82	36.	3.4	NW
23:00	0.012	279.11	259.88	0.50	252.93	64.73	324.61	42.92	43.72	35.94	4.96	4 86	11.	6.3	N
0:00	0.016	273.93	272.78	0 50	251.38	64.33	337.11	43.99	45.13	35.99	5 03	4 95	1.	6.7	NNE
1:00	0 020	276.43	267.58	[illegible]	251.24	64.30	331.85	43.55	45 56	36.29	4.99	4.75	1.	3.6	WNW
2:00	0.020	280.66	257.41	0.50	251.20	64.29	[illegible]	42.61	44 04	36.29	4 92	4.65	7.	3.3	NW
3:00	[illegible]	273.71	257.73	[illegible]	248.40	63.57	321.30	42.43	43.76	36.05	4.87	4.77	30.	2.9	WNW
4:00	0 018	276.89	245.49	0.50	248.73	63.65	309.14	41.34	42.32	35.82	4 82	4.99	6.	1.9	WSW
5:00	0.018	275.02	243.05	0.50	249 09	63.75	306.79	41.16	42.57	35.81	4.79	5.02	6.	3.1	WSW
6:00	0.017	275.79	241.98	0.50	249.85	63.94	305.92	41.12	42 27	35.84	4 79	4.98	60.	2.1	WSW
7:00	0.014	277.04	234.52	0.50	249.35	63.81	298.33	40 42	41.48	35.56	4.72	4.91	118.	3.2	ESE
8:00	0.014	283.86	244.73	0.50	233.02	59 64	304.36	40.15	42 94	33.34	4.66	5 38	857.	4.8	ENE
9:00	0.018	[illegible]	249.52	0.50	[illegible]	65.38	314.80	42.33	51 78	36.40	4.93	5 04	1370.	4.9	ENE
AVERAGE	0.018	277.31	265.15	0.50	253.77	64.94	330.09	43 54	45.68	36 46	4 99	4.67	772.	2.2	WNW
TOTAL REFINERY AVERAGE	0 018	309.85	296.31	0.50	254.62	65 16	363.49	51.55	53.69	36.58	6.45				

BASELINE TEST (8-12-81)

3-14

C.O. ADDRESS ERROR 23

GETTY REFINING AND MARKETING CO.
BAKERSFIELD REFINERY
DAILY EMISSIONS REPORT (HOURLY AVERAGE)
NORTH PLANT
AUGUST 14, 1981 10:47

TIME	FUEL BURNED							EMISSIONS(LB/HR)						WIND	
	FUEL GAS			FUEL OIL			TOTAL	NO2	NO2	SO2	part	O2	INCIN SO2	Speed	From
	H2S Gr/dscf	MSCFH	MMBtu/Hr	Wt %S	B/D	MMBtu/Hr	MMBtu/Hr	firebox	stack			%	ppm	mph	
11 00	0.015	282 59	264.91	0 50	252.55	64 63	329.54	43.52	56.53	36.13	5 01	4.67	1749.	4.1	ENE
12:00	0.015	277.18	260.46	0.50	249.69	63.90	324.36	42.88	56 37	35 68	4 91	4.65	292	0.9	N
13:00	0.014	282.02	265.75	0.50	249.33	63.81	329.55	43 34	55.68	35.61	5 00	4 62	110.	3.5	W
14:00	0.015	284.79	268.22	0.50	246.65	63 12	331 35	43.35	55.64	35.29	5 00	4.60	69.	3.6	WNW
15:00	0 016	284.86	269.49	0.50	244.88	62.67	332 16	43.34	55 28	35.13	4.99	4.57	62.	4 6	W
16:00	0.016	285.16	268 98	0.50	237.56	60.80	329.78	42.72	55 08	34.14	4 91	4.59	59	5.7	W
17:00	0.016	285 33	266.48	0.50	237.50	60.78	327.26	42 49	53.85	34.11	4 87	4 56	56.	4.9	W
18:00	0.015	287.59	269 20	0.50	235 81	60.35	329.55	42 62	53.80	33.83	4.89	4.58	59	4.6	W
19:00	0.015	288.04	272.11	[illegible]	236.58	60.85	332.66	42.95	53.88	33.91	4.93	4.58	52.	3.3	WNW
20 00	0.013	290.76	275 87	[illegible]	239.80	61.39	336.87	43.54	54 33	34.30	5 00	4 56	45.	3.4	WNW
21:00	0.013	290.37	277.04	[illegible]	239 48	61.28	338.32	43.64	54.39	34.18	4 96	4.61	42.	5.0	W
22:00	0.012	294.56	278.06	0.50	238.72	61.09	339.15	43.66	53.75	34.00	5 00	4.62	50.	5.0	N
23:00	0.010	300 92	278.15	0 50	240.58	61.57	339.72	43.81	52 68	34.13	4.99	4.61	53.	5 2	N
0:00	0.013	292 61	275.53	0 50	238.14	60.94	336.47	43.39	54.13	34.00	4 95	4.57	57.	2.9	NW
1:00	0.011	291.42	268.63	0.50	234.34	59 97	328 61	42.47	53.49	33.46	4 93	4.61	61.	3.3	WSW
2:00	0.013	291.88	271.30	0.50	238.20	60.96	332.26	43.00	53.51	33.98	4 91	4 60	58.	6.5	SW
3:00	0.012	290.75	269 63	0.50	238.83	61.12	330.75	42.88	53.34	34.04	4.91	4.61	63.	3.7	SSW
4 00	0.012	283.66	257.08	0.50	236.76	60.59	317.67	41.60	52 02	33 68	4.71	4.61	91	3.7	SSW
5:00	0.012	283.85	260.30	0.50	233.19	59 68	319.98	41.59	52 24	33.22	4.69	4.62	166.	2.2	WNW
6:00	0 012	282 69	260.17	0.50	230.49	58 99	319.15	41.37	51.77	32.86	4 66	4.70	311.	0.8	NNE
7:00	0.013	281.64	256.81	0.50	229 43	58.72	315.53	40.98	51.51	32.70	4.63	4.74	512.	0.8	NW
8:00	0.013	284 33	255.10	0.50	220.75	56 49	311 59	40 16	50.84	31 48	4.55	4.67	718	1.9	W
9:00	0 011	275.12	236.65	0.50	241 10	61.70	298.35	40.06	26.33	34.21	4.60	5 21	525.	3.0	SSW
10:00	0.009	283 61	240.52	0 50	237.76	60.85	301.37	40.13	25 72	33.64	4 60	8.91	1041.	3.3	SSW
AVERAGE	0.013	286.53	265.26	0 50	238.67	61.08	326 34	42 48	51 47	34 07	4.85	4.83	263	2.6	WNW
TOTAL REFINERY AVERAGE	0 013	320.10	296.35	0.50	239.52	61.30	360.75	50.26	59 25	34.19	6.32				

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GROUP HOURLY AVERAGES   TIME: 10:54        DATE: 12AUG81                PAGE   1

HP-323

TIME     15F-118   15F-124   15F-128   81FY-101  15FC-114  15FC-112  15FD-112  15PC-107
                                       FUEL GAS  M-SCFH    M-SCFH    [illegible]  PSIG

         FUEL GAS  AMINE       H2      SPECIFIC  MAKEUP     LION     OUTPUT   FUEL GAS
            TO     RETURN   FUEL GAS   GRAVITY    GAS       GAS       DIFF
           UNIT    ACCUM                         SUPPLY    SUPPLY    CONTROL    DRUM
                   OFFGAS     DRUM

05:00      370     10.08      231      0.471     53.0      40.0      41.9      45.1
06:00      369     10.10      223      0.473     53.5      40.0      42.0      45.1
07:00      358      9.90      228      0.466     56.1      40.0      42.6      45.0
08:00      363     10.25      226      0.469     55.0      40.0      43.5      45.1
09:00      371     10.69      234      0.473     47.1      40.0      39.9      45.1
10:00      371     10.77      240      0.481     31.5      40.0      35.3      45.1
11:00      362     10.69      239      0.491     39.5      40.0      37.5      45.0
12:00      361     10.59      231      0.492     52.6      40.0      41.1      45.0
13:00      360     10.94      233   [illegible] [illegible] 40.0     47.4      45.0
14:00      361     11.16      230      0.494     74.7      40.0      47.2      45.0
15:00      357     11.11      235      0.502     82.5      40.0      49.4      45.0
16:00      359     11.04      231      0.507     85.0      40.0      50.0      45.0
17:00      358     10.59      226      0.495    118.5      40.0      59.3      44.9
18:00      360     10.64      228      0.492    124.9      40.0      61.0      45.2
19:00      355     10.62      233      0.496     95.3      40.0      52.8      45.1
20:00      356     10.47      224      0.496     84.4      40.0      50.1      45.1
21:00      359     10.54      222      0.493    103.5      40.0      55.5      44.9
22:00      361     10.42      223      0.497    107.2      40.0      53.7      45.2
23:00      356      9.33      228      0.499     96.9      40.0      53.8      45.0
24:00      361     10.13      220      0.491    105.7      40.0      55.7      45.0
01:00      361     10.52      224      0.497    124.2      40.0      61.6      45.1
02:00      353     10.50      229      0.505     84.1      40.0      50.7      45.1
03:00      357     10.30      230      0.524     85.9      40.0      51.1      45.2
04:00      344     10.40      213      0.551     53.3      40.0      44.0      45.0
05:00      340     10.59      214      0.553     68.9      40.0      45.4      45.1
06:00      333     15.04      207      0.582     45.5      40.0      40.1      45.1
07:00      334     15.16      196      0.578     73.3      40.0      47.4      45.0
08:00      340     15.36      197      0.564     86.4      40.0      51.0      45.1
09:00      331     16.24      210      0.563     42.7      40.0      41.7      45.1
10:00      327     15.15      216      0.574     17.5      40.2      37.6      45.2
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BASELINE TEST (8-11-81)

X

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GROUP HOURLY AVERAGES   TIME: 20:17        DATE: 12AUG81                        PAGE    1

GRP-023

TIME    15F-118   15F-124   15F-128  81FY-101 15FC-114 15FC-112 15FD-112 15PC-107
                                     FUEL GAS  M-SCFH   M-SCFH    AMPS     PSIG

        FUEL GAS  AMINE      H2      SPECIFIC  MAKEUP    LION    OUTPUT  FUEL GAS
           TO     RETURN  FUEL GAS   GRAVITY    GAS      GAS      DIFF
          UNIT    ACCUM                        SUPPLY   SUPPLY   CONTROL    DRUM
                  OFFGAS    DRUM

15:00      357    11.11      235      0.502     82.5     40.0     49.4     45.0
16:00      358    11.04      231      0.507     85.0     40.0     50.0     45.0
17:00      359    10.59      224      0.495    118.5     40.0     50.3     44.9
18:00      360    10.64      228      0.492    124.9     40.0     51.0     45.2
19:00      355    10.62      233      0.496     95.3     40.0     52.8     45.1
20:00      356    10.47      223      0.496     81.3     40.0     50.1     45.1
21:00      359    10.54      222      0.493    103.6     40.0     55.5     44.9
22:00      361    10.42 [illegible]   0.497    107.9     40.0     56.7     45.2
23:00 [illegible]  9.83 [illegible] [illegible] [illegible] 40.0  53.8     45.0
24:00      361    10.13      220      0.491    105.7     40.0     56.7     45.0
01:00      361    10.52      224      0.497    124.2     40.0     51.6     45.1
02:00      359    10.50      222      0.505     81.1     40.0     50.7     45.1
03:00      357    10.30      230      0.524     85.9     40.0     51.1     45.2
04:00      344    10.40      219      0.551     53.0     40.0     12.0     45.0
05:00      340    10.59      214      0.568     68.9     40.0     46.4     45.1
06:00      333    15.04      207      0.582     46.6     40.0     40.1     45.1
07:00      334    15.16      196      0.578     73.3     40.0     47.6     45.0
08:00      340    15.36      197      0.561     86.1     40.0     51.0     45.1
09:00      331    16.94      210      0.568     42.7     40.0     33.7     45.1
10:00      327    16.15      216      0.573     17.5     30.2     27.6     45.2
11:00      327    19.39      212      0.584      6.2     24.4     22.2     45.1
12:00      323    23.34      215      0.532      5.3     24.2     21.5     45.0
13:00      329    18.99      202      0.549     25.5     29.7     22.3     45.0
14:00      323    15.76      223      0.577     12.9     23.0     21.5     45.3
15:00      324    16.97      218      0.574      9.0     27.6     24.8     44.9
16:00      330    15.51      214      0.544     27.3     30.0     30.6     45.1
17:00      333    15.73      229      0.572     14.2     29.9     26.8     45.1
18:00      326    15.46      234      0.574      7.5     29.3     25.0     45.0
19:00      334    17.73      227      0.550     25.7     30.0     30.2     45.0
20:00      335    22.77      231      0.549     13.9     30.0     23.6     45.0
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BASELINE TEST (8-11-81)

BASELINE TEST (8-12-81)

GROUP HOURLY AVERAGES   TIME: 22:22   DATE: 13AUG81   PAGE 1

GRP-023

TIME	15F-118 FUEL GAS TO UNIT	15F-124 AMINE RETURN ACCUM OFFGAS	15F-128 H2 FUEL GAS DRUM	31FY-101 FUEL GAS SPECIFIC GRAVITY	15FC-114 M-SCFH MAKEUP GAS SUPPLY	15FC-112 M-SCFH LION GAS SUPPLY	15FD-112 AMPS OUTPUT DIFF CONTROL	15PC-107 PSIG FUEL GAS DRUM
17:00	333	15.73	229	0.572	14.2	29.9	25.8	45.1
18:00	326	15.46	234	0.574	7.6	29.3	25.0	45.0
19:00	334	17.73	227	0.550	25.7	30.0	30.2	45.0
20:00	335	22.77	234	0.549	13.9	30.0	23.6	45.0
21:00	331	25.24	232	0.501	13.5	29.5	20.3	45.1
22:00	324	23.68	235	0.579	5.3	17.2	17.0	45.3
23:00	336	20.38	[illegible]	0.527	61.5	20.0	36.6	44.9
24:00	326	16.72	[illegible]	0.563	23.4	17.0	24.0	45.2
01:00	328	14.18	[illegible]	[illegible]	27.8	15.0	24.3	45.0
02:00	340	13.61	223	0.517	77.5	15.0	33.0	45.1
03:00	331	12.45	242	0.535	23.4	15.0	22.9	45.1
04:00	336	11.01	233	0.501	50.3	15.0	31.9	44.9
05:00	338	10.08	254	0.496	39.1	19.8	29.7	45.1
06:00	338	9.48	254	0.494	34.5	20.0	23.7	45.0
07:00	342	9.34	[illegible]	0.475	61.1	20.0	36.1	45.0
08:00	343	8.42	259	0.479	51.5	20.0	33.4	45.1
09:00	341	8.94	266	0.499	21.8	19.9	25.0	45.1
10:00	340	9.58	236	0.511	41.1	20.0	30.1	45.0
11:00	342	12.20	231	0.516	39.3	20.0	29.7	45.1
12:00	335	13.78	234	0.516	32.9	20.0	27.6	45.0
13:00	337	13.76	227	0.520	43.0	20.0	30.2	45.0
14:00	341	12.67	231	0.518	48.5	20.0	31.9	45.1
15:00	341	9.58	238	0.520	45.4	20.0	31.4	45.1
16:00	341	9.61	234	0.521	53.1	20.0	33.3	45.0
17:00	342	9.58	229	0.513	59.5	20.0	35.1	45.0
18:00	345	9.41	231	0.514	66.4	20.0	37.2	45.0
19:00	345	9.43	231	0.515	77.9	20.0	40.3	45.1
20:00	347	9.41	235	0.523	131.5	20.0	55.4	44.9
21:00	345	12.50	233	0.527	140.6	20.0	59.5	45.1
22:00	351	13.36	226	0.523	162.3	27.0	70.6	44.1

BASELINE TEST (8-12-81)

LOW NOx TEST (8-13-81)

GROUP HOURLY AVERAGES TIME: 08:57 DATE: 12AUG81 PAGE 1

GRP-132 STM PLNT BOILER 1

TIME	31LC-352 PERCENT	31YI0381 PERCENT	31LC1001 PERCENT	31FC1041 MLB-HR	31AC1001 PERCENT	31YI02A1 MMBTU-HR	31YI01C1 MMBTU-HR	31LC-355 PERCENT
	DEAERATR LEVEL	OXYGEN DEMAND BOILER NO.1	LEVEL BOILER NO.1	BFW MAKEUP BOILER NO.1	STACK OXYGEN BOILER NO.1	DEMAND RATE BOILER NO.1	FUEL OIL FEED BOILER NO.1	BFW STORGE TANK LEVEL
03:00	60.0	53.9	50.1	31.8	1.86	20.0	20.5	76.4
04:00	60.0	53.6	50.1	31.7	1.87	20.0	20.5	73.6
05:00	60.2	53.7	50.1	31.7	1.87	20.0	20.5	76.6
06:00	60.3	53.5	50.1	31.7	1.91	20.0	20.5	73.5
07:00	59.8	60.1	50.1	33.5	1.63	21.0	21.4	76.7
08:00	60.4	59.9	50.1	34.6	1.52	22.6	23.1	73.4
09:00	59.9	55.2	50.1	32.5	1.56	24.7	25.2	76.7
10:00	60.0	54.1	50.1	32.0	2.02	25.1	25.6	73.5
11:00	[illegible]	54.1	[illegible]	32.0	1.78	20.0	20.5	76.7
12:00	60.1	54.2	50.1	32.0	1.78	20.0	20.5	73.5
13:00	60.0	54.2	50.1	32.0	1.80	20.0	20.5	76.7
14:00	60.3	54.5	50.1	32.1	1.73	20.0	20.5	73.5
15:00	60.0	54.6	50.1	32.2	1.80	20.0	20.5	76.7
16:00	60.0	54.7	50.1	32.2	1.80	20.0	20.5	73.4
17:00	[illegible]	54.6	50.1	32.2	1.73	20.0	20.5	76.7
18:00	60.1	54.8	50.1	32.0	1.79	20.0	20.5	73.4
19:00	60.1	54.9	50.1	31.9	1.84	20.0	20.5	76.6
20:00	60.4	54.8	50.1	31.8	1.83	20.0	20.5	73.3
21:00	59.8	54.7	50.1	31.8	1.86	20.0	20.5	76.2
22:00	60.3	54.8	50.1	31.8	1.84	20.0	20.5	74.2
23:00	[illegible]	54.7	50.1	31.8	1.86	20.0	20.5	75.3
24:00	60.1	54.3	50.1	31.6	1.83	20.0	20.5	73.5
01:00	60.1	54.1	50.1	31.5	1.83	20.0	20.5	77.3
02:00	60.2	54.2	50.1	31.6	1.81	20.0	20.5	73.1
03:00	59.9	54.2	50.1	31.6	1.85	20.0	20.5	76.3
04:00	60.2	54.4	50.1	31.7	1.82	20.0	20.5	73.5
05:00	60.1	54.3	50.1	31.6	1.81	20.0	20.5	76.6
06:00	60.1	54.3	50.1	31.7	1.81	20.0	20.5	73.6
07:00	60.3	54.4	50.1	31.6	1.73	21.8	22.2	76.1
08:00	60.1	54.4	50.1	31.7	1.93	23.0	23.4	74.1

BASELINE TEST (8-11-81)

↑
Steam flow

GROUP HOURLY AVERAGES TIME: 22:22 DATE: 13AUG81 PAGE 1

GRP-132 STM PLNT BOILER 1

TIME	31LC-352 PERCENT	31YI0331 PERCENT	31LC1001 PERCENT	31FC1011 MLB-HR	31AC1001 PERCENT	31YI0241 MMBTU-HR	31FI0101 MMBTU-HR	31LC-355 PERCENT
	DEAERATR LEVEL	OXYGEN DEMAND BOILER NO.1	LEVEL BOILER NO.1	BFW MAKEUP BOILER NO.1	STACK OXYGEN BOILER NO.1	DEMAND RATE BOILER NO.1	FUEL OIL FEED BOILER NO.1	BFW STORGE TANK LEVEL
17:00	60.5	55.3	50.1	32.1	1.80	20.0	20.5	75.5
18:00	59.7	55.3	50.1	32.1	1.77	20.0	20.5	74.9
19:00	60.5	55.0	50.1	32.0	1.82	20.0	20.5	75.0
20:00	59.8	55.1	50.1	31.9	1.82	20.0	20.5	75.4
21:00	60.2	54.8	50.1	31.9	1.83	20.0	20.5	74.2
22:00	60.3	54.9	50.1	31.9	1.81	20.0	20.5	76.1
23:00	59.9	54.1	50.1	31.5	1.86	20.0	20.5	73.5
24:00	60.2	54.4	50.1	31.6	1.80	20.0	20.5	76.7
01:00	60.1	54.3	50.1	31.6	1.88	20.0	20.5	73.6
02:00	60.1	53.8	50.1	31.3	1.85	20.0	20.5	76.5
03:00	60.1	54.1	50.1	31.5	1.84	20.0	20.5	73.6
04:00	60.2	53.8	50.1	31.3	1.90	20.0	20.5	76.6
05:00	59.8	53.7	50.1	31.3	1.87	20.0	20.5	73.4
06:00	60.4	53.4	50.1	31.1	1.89	20.0	20.5	76.9
07:00	60.0	53.3	50.1	31.1	1.83	20.0	20.5	72.9
08:00	60.1	53.9	50.1	31.5	1.77	23.8	21.3	75.5
09:00	60.1	53.7	50.2	31.2	1.84	20.1	20.6	76.5
10:00	60.0	54.0	50.1	31.1	1.77	20.0	20.5	74.0
11:00	60.0	54.2	50.1	31.6	1.80	20.0	20.5	75.9
12:00	60.2	54.5	50.1	31.7	1.79	20.0	20.5	74.7
13:00	59.9	54.5	50.1	31.7	1.81	19.9	20.5	75.1
14:00	59.9	54.5	50.1	31.7	1.80	20.0	20.5	75.3
15:00	60.5	54.7	50.1	31.3	1.80	19.9	20.4	74.6
16:00	59.3	54.7	50.1	31.3	1.82	20.0	20.5	75.7
17:00	60.4	54.6	50.1	31.3	1.81	20.0	20.5	74.4
18:00	60.1	54.7	50.1	31.8	1.79	20.0	20.5	75.8
19:00	60.0	54.6	50.1	31.8	1.82	20.0	20.5	74.5
20:00	60.3	54.6	50.1	31.3	1.82	20.0	20.5	75.4
21:00	60.1	54.4	50.1	31.7	1.93	20.0	20.5	75.0
22:00	60.1	53.9	50.1	31.5	1.91	20.0	20.5	74.7

BASELINE TEST (8-12-81)

LOW NOx TEST (8-13-81)

81

GROUP HOURLY AVERAGES   TIME: 19:40   DATE: 11AUG81   PAGE 1

GRP-131   STM PLNT BOILER 1

TIME	81PC-100 PSIG BOILER UNIT STEAM PRESS	81PI36-1 PSIG STEAM DRUM PRESS	81FC1011 MMBTU-HR FUEL GAS FLOW BOILER NO.1	81FC1021 MMBTU-HR FUEL OIL FLOW BOILER NO.1	81FC1001 M-SCFH COMB AIR BOILER NO.1	81PC1011 MMBTU-HR DEMAND LOAD BOILER NO.1	81YI01A1 OVERRIDE FUEL GAS PRES BOILER NO.1	81YI01A1 M-SCFH AIR MAKEUP BOILER NO.1
14:00	250.7	270.8	20.0	24.7	515	51.9	------	463
15:00	250.1	270.4	20.0	24.7	515	50.4	------	463
16:00	250.7	270.4	20.0	24.7	516	49.9	------	467
17:00	250.1	270.4	20.0	24.7	516	50.1	------	463
18:00	250.1	270.4	20.0	24.7	515	52.5	------	463
19:00	250.7	270.4	20.0	24.7	516	50.3	------	467
20:00	250.1	270.4	20.0	24.7	515	50.5	------	467
21:00	249.5	269.7	20.0	24.7	515	50.9	------	467
22:00	250.1	270.1	20.0	24.7	516	53.5	------	468
23:00	250.7	270.4	20.0	24.7	515	54.2	------	467
24:00	250.7	270.1	20.0	24.7	515	51.9	------	467
01:00	250.1	269.7	20.0	24.7	515	51.5	------	467
02:00	250.7	270.1	20.0	24.5	515	50.6	------	466
03:00	250.1	269.7	20.0	24.7	515	51.9	------	467
04:00	250.1	269.7	20.0	24.7	516	51.1	------	467
05:00	250.1	269.7	20.0	24.6	515	51.6	------	467
06:00	250.1	270.1	20.0	24.7	516	51.4	------	467
07:00	231.9	253.2	20.8	26.2	539	71.8	------	490
08:00	239.0	261.2	23.0	26.1	562	57.5	------	513
09:00	250.7	270.8	23.8	22.0	515	50.6	------	479
10:00	250.1	269.7	26.1	19.3	517	49.6	------	475
11:00	250.1	269.7	20.0	24.7	516	50.1	------	467
12:00	250.1	269.7	20.0	24.7	516	51.2	------	467
13:00	250.7	270.1	20.0	24.7	515	52.2	------	467
14:00	250.1	269.7	20.0	24.7	515	53.0	------	467
15:00	250.7	270.4	20.0	24.7	515	51.4	------	467
16:00	249.5	269.7	20.0	24.7	516	52.4	------	463
17:00	250.7	270.4	20.0	24.7	516	54.3	------	468
18:00	250.1	270.1	20.0	24.7	515	52.9	------	469
19:00	250.7	270.4	20.0	24.7	515	52.2	------	463

BASELINE TEST (8-11-81)

SH

GROUP HOURLY AVERAGES TIME: 23:16 DATE: 12AUG81 PAGE 1

GRP-131 STM PLNT BOILER 1

TIME	31PC-100 PSIG BOILER UNIT STEAM PRESS	31PI06-1 PSIG STEAM DRUM PRESS	31FC1011 MMBTU-HR FUEL GAS FLOW BOILER NO.1	31FC1021 MMBTU-HR FUEL OIL FLOW BOILER NO.1	31FC1001 K-SCFH COMB AIR BOILER NO.1	31PC1011 MMBTU-HR DEMAND LOAD BOILER NO.1	31YI01B1 OVERRIDE FUEL GAS PRES BOILER NO.1	31YI01A1 K-SCFH AIR MAKEUP BOILER NO.1
15:00	250.7	270.4	20.0	24.7	515	51.4	------	467
16:00	249.5	269.7	20.0	24.7	516	52.4	------	468
17:00	250.7	270.4	20.0	24.7	516	54.3	------	469
18:00	250.1	270.1	20.0	24.7	515	52.9	------	469
19:00	250.7	270.4	20.0	24.7	515	52.2	------	468
20:00	250.1	270.1	20.0	24.7	515	52.3	------	469
21:00	250.1	269.7	20.0	24.7	516	53.7	------	468
22:00	250.7	270.4	20.0	24.7	516	52.9	------	467
23:00	250.1	270.1	20.0	24.7	516	52.2	------	467
24:00	250.7	270.1	20.0	24.7	515	52.9	------	467
01:00	250.1	270.1	20.0	24.7	516	53.5	------	467
02:00	250.7	270.4	20.0	24.7	515	52.3	------	467
03:00	251.3	270.8	20.0	24.7	516	49.4	------	467
04:00	250.1	270.1	20.0	24.7	516	46.2	------	467
05:00	249.5	269.3	20.0	24.7	516	52.3	------	467
06:00	250.1	269.7	20.0	24.7	515	53.0	------	467
07:00	250.1	270.1	20.8	24.0	515	53.4	------	468
08:00	250.1	270.1	26.8	18.7	517	52.3	------	476
09:00	250.7	270.1	20.0	24.6	515	52.2	------	467
10:00	250.7	270.1	20.0	24.6	515	51.7	------	467
11:00	250.1	270.4	20.0	24.6	516	52.7	------	467
12:00	250.1	270.1	20.0	24.7	515	52.3	------	467
13:00	250.7	270.4	20.0	24.7	515	52.4	------	467
14:00	250.1	270.4	20.0	24.7	515	53.2	------	467
15:00	250.1	270.1	20.0	24.7	516	53.6	------	467
16:00	250.1	270.4	20.0	24.7	516	54.6	------	467
17:00	250.1	270.4	20.0	24.7	516	55.2	------	467
18:00	250.1	270.4	20.0	24.7	515	54.7	------	467
19:00	250.7	270.4	20.0	24.7	515	55.0	------	467
20:00	250.1	270.1	20.0	24.7	515	55.8	------	469

BASELINE TEST (8-11-81)

BASELINE TEST (8-12-81)

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GROUP HOURLY AVERAGES   TIME: 03:57        DATE: 12AUG81                PAGE   1

3HP-131                    STM PLNT BOILER 1

TIME     31PC-100 31PI06-1 31FC1011 31FC1021 31FC1001 31PC1011 31YI01B1 31YI01A1
           PSIG     PSIG   MMBTU-HR MMBTU-HR  M-SCFH  MMBTU-HR [illegible] M-SCFH

          BOILER    STEAM   FUEL GAS FUEL OIL   COMB    DEMAND  FUEL GAS   AIR
           UNIT     DRUM     FLOW     FLOW      AIR      LOAD     PRES    MAKEUP
          STEAM    PRESS    BOILER   BOILER   BOILER   BOILER   BOILER   BOILER
          PRESS              NO.1     NO.1     NO.1     NO.1     NO.1     NO.1

03:00     250.1    269.7     20.0     24.7     515      51.9    -----      467
04:00     250.1    269.7     20.0     24.7     515      51.1    -----      467
05:00     250.1    269.7     20.0     24.6     516      51.6    -----      467
06:00     250.1    270.1     20.0     24.7     515      51.4    -----      467
07:00     231.9    253.2     20.6     26.2     539      71.8    -----      490
08:00     239.0    261.2     21.0     26.1     502      57.5    ------     513
09:00     250.7    270.8     23.0     22.0     515      50.6    -----      479
10:00     250.1    269.7     26.[illegible]  19.3     517      49.6    -----      475
11:00     [illegible] 269.7  [illegible] [illegible] [illegible] [illegible] ----- [illegible]
12:00     250.1    269.7     20.0     24.7     515      51.2    -----      467
13:00     250.7    270.1     20.0     24.7     515      52.2    -----      467
14:00     250.1    269.7     20.0     24.7     515      53.0    ------     467
15:00     250.7    270.4     20.0     24.7     516      51.4    -----      467
16:00     249.5    269.7     20.0     24.7     516      52.4    -----      468
17:00     250.7    270.4     20.0     24.7     516      54.8    -----      468
18:00     250.1    270.1     20.0     24.7     515      52.9    -----      468
19:00     250.7    270.4     20.0     24.7     515      52.2    ------     468
20:00     250.1    270.1     20.0     24.7     515      52.3    ------     468
21:00     250.1    269.7     23.0     24.7     516      53.7    -----      468
22:00     250.7    270.4     20.0     24.7     516      52.9    -----      467
23:00     250.1    270.1     20.0     24.7     516      52.2    -----      467
24:00     250.7    270.1     20.0     24.7     516      52.9    -----      467
01:00     250.1    270.1     20.0     24.7     515      53.5    -----      467
02:00     250.7    270.4     20.0     24.7     515      52.3    ------     467
03:00     251.3    270.8     20.0     24.7     516      49.4    -----      467
04:00     250.1    270.1     20.0     24.7     516      46.2    -----      467
05:00     249.5    269.3     20.0     24.7     515      52.3    -----      467
06:00     250.1    269.7     20.0     24.7     515      53.0    ------     467
07:00     250.1    270.1     20.8     24.0     515      53.4    ------     468
08:00     250.1    270.1     20.3     18.7     517      52.3    ------     475
```

BASELINE (8-11-81)
TEST

GROUP HOURLY AVERAGES TIME: 22:21 DATE: 13AUG81 PAGE 1

3GP-131 STM PLNT BOILER 1

TIME	31PC-100 PSIG	31PI06-1 PSIG	31FC1011 MMBTU-HR	31FC1021 MMBTU-HR	31FC1001 M-SCFH	31PC1011 MMBTU-HR	31Y1013I OVERRIDE	31Y1014I M-SCFH
	BOILER UNIT STEAM PRESS	STEAM DRUM PRESS	FUEL GAS FLOW BOILER NO.1	FUEL OIL FLOW BOILER NO.1	COMB AIR BOILER NO.1	DEMAND LOAD BOILER NO.1	FUEL GAS PRES BOILER NO.1	AIR MAKEUP BOILER NO.1
17:00	250.1	270.4	20.0	24.7	516	55.2	------	467
18:00	250.1	270.4	20.0	24.7	515	51.7	------	467
19:00	250.7	270.4	20.0	24.7	515	55.0	------	467
20:00	250.1	270.1	20.0	24.7	516	56.8	------	463
21:00	250.7	270.8	20.0	24.7	516	54.8	------	468
22:00	250.1	270.1	20.0	24.6	515	51.0	------	467
23:00	250.1	270.1	20.0	24.7	516	56.0	------	467
24:00	250.1	270.4	20.0	24.7	516	55.2	------	467
01:00	250.7	270.1	20.0	24.7	516	55.9	------	467
02:00	250.1	270.1	20.0	24.7	516	55.9	------	467
03:00	250.7	270.4	20.0	24.6	515	54.1	------	467
04:00	249.5	269.3	20.0	24.7	515	55.7	------	467
05:00	250.7	270.4	20.0	24.6	516	55.6	------	467
06:00	250.1	269.3	20.0	24.5	516	54.8	------	465
07:00	250.1	269.7	20.0	24.7	516	55.3	------	467
08:00	249.5	269.0	23.3	21.1	517	54.4	------	469
09:00	250.1	269.7	20.0	24.6	515	56.0	------	466
10:00	250.7	270.1	20.0	24.7	515	58.9	------	467
11:00	251.3	270.4	20.0	24.7	516	55.4	------	467
12:00	250.1	269.7	20.0	24.7	516	52.7	------	467
13:00	249.5	269.3	20.0	24.7	516	57.2	------	467
14:00	250.1	270.4	20.0	24.7	515	53.7	------	468
15:00	250.1	270.1	20.0	24.7	515	59.2	------	463
16:00	250.1	270.1	20.0	24.7	515	60.7	------	467
17:00	250.1	270.1	20.0	24.7	515	59.6	------	467
18:00	250.1	270.1	20.0	24.7	516	61.0	------	463
19:00	250.1	270.1	20.0	24.7	516	61.3	------	468
20:00	250.1	270.1	20.0	24.7	515	52.0	------	469
21:00	250.7	270.1	20.0	24.3	516	59.9	------	469
22:00	250.1	269.7	20.0	24.7	515	51.6	------	468

BASELINE TEST (8-12-81)

Low NOx TEST (8-13-81)

3.2 BOILER THERMAL EFFICIENCY CALCULATION

SUMMARY SHEET

ASME TEST FORM FOR ABBREVIATED EFFICIENCY TEST

PTC 4.1-a (1964)

TEST NO. 1 BOILER NO. 81-H1 DATE 8-12-81
OWNER OF PLANT Mohawk - Getty LOCATION Bakersfield CA
TEST CONDUCTED BY Acurex Corp OBJECTIVE OF TEST Emission Test DURATION 5 Hr
BOILER, MAKE & TYPE Two Drum Zurn Keystone RATED CAPACITY 60,000 lb/hr
STOKER, TYPE & SIZE
PULVERIZER, TYPE & SIZE BURNER, TYPE & SIZE
FUEL USED N. 6 oil + Ref Gas MINE COUNTY STATE SIZE AS FIRED

PRESSURES & TEMPERATURES

1	STEAM PRESSURE IN BOILER DRUM	psia	285
2	STEAM PRESSURE AT S. H. OUTLET	psia	265
3	STEAM PRESSURE AT R. H. INLET	psia	-
4	STEAM PRESSURE AT R. H. OUTLET	psia	-
5	STEAM TEMPERATURE AT S. H. OUTLET	F	495
6	STEAM TEMPERATURE AT R.H. INLET	F	—
7	STEAM TEMPERATURE AT R.H. OUTLET	F	—
8	WATER TEMP. ENTERING (ECON.)(BOILER)	F	85
9	STEAM QUALITY % MOISTURE OR P. P. M.		0
10	AIR TEMP. AROUND BOILER (AMBIENT)	F	100
11	TEMP. AIR FOR COMBUSTION (This is Reference Temperature) †	F	100
12	TEMPERATURE OF FUEL oil	F	198
13	GAS TEMP. LEAVING (Boiler) (Econ.) (Air Htr.)	F	384
14	GAS TEMP. ENTERING AH (If conditions to be corrected to guarantee)	F	—

UNIT QUANTITIES

15	ENTHALPY OF SAT. LIQUID (TOTAL HEAT)	Btu/lb	380
16	ENTHALPY OF (SATURATED) (SUPERHEATED) STM.	Btu/lb	1262
17	ENTHALPY OF SAT. FEED TO (BOILER) (ECON.)	Btu/lb	51
18	ENTHALPY OF REHEATED STEAM R. H. INLET	Btu/lb	—
19	ENTHALPY OF REHEATED STEAM R. H. OUTLET	Btu/lb	—
20	HEAT ABS/LB OF STEAM (ITEM 16 – ITEM 17)	Btu/lb	
21	HEAT ABS/LB R.H. STEAM (ITEM 19 – ITEM 18)	Btu/lb	—
22	DRY REFUSE (ASH PIT + FLY ASH) PER LB AS FIRED FUEL	lb/lb	—
23	Btu PER LB IN REFUSE (WEIGHTED AVERAGE)	Btu/lb	—
24	CARBON BURNED PER LB AS FIRED FUEL	lb/lb	0.819
25	DRY GAS PER LB AS FIRED FUEL BURNED	lb/lb	17.5

HOURLY QUANTITIES

26	ACTUAL WATER EVAPORATED	lb/hr	32,000
27	REHEAT STEAM FLOW	lb/hr	-
28	RATE OF FUEL FIRING (AS FIRED wt)	lb/hr	2105 b
29	TOTAL HEAT INPUT $\frac{\text{(Item 28} \times \text{Item 41)}}{1000}$	kB/hr	45405
30	HEAT OUTPUT IN BLOW-DOWN WATER	kB/hr	—
31	TOTAL HEAT OUTPUT $\frac{\text{(Item 26} \times \text{Item 20)} + \text{(Item 27} \times \text{Item 21)}}{1000}$ + Item 30	kB/hr	38752

FLUE GAS ANAL. (BOILER)(ECON) (AIR HTR) OUTLET

32	CO_2	% VOL	11.7
33	O_2	% VOL	2.6
34	CO	% VOL	-
35	N_2 (BY DIFFERENCE)	% VOL	85.7
36	EXCESS AIR	%	12.8

FUEL DATA

	COAL AS FIRED PROX. ANALYSIS	% wt
37	MOISTURE	
38	VOL MATTER	
39	FIXED CARBON	
40	ASH	
	TOTAL	
41	Btu per lb AS FIRED	
42	ASH SOFT TEMP.* ASTM METHOD	

	COAL OR OIL AS FIRED ULTIMATE ANALYSIS a	
43	CARBON	86.53
44	HYDROGEN	11.50
45	OXYGEN	0.71
46	NITROGEN	0.65
47	SULPHUR	0.47
40	ASH	-
37	MOISTURE	—
	TOTAL	

	COAL PULVERIZATION	
48	GRINDABILITY INDEX*	
49	FINENESS % THRU 50 M*	
50	FINENESS % THRU 200 M*	

	OIL	
51	FLASH POINT F*	
52	Sp. Gravity Deg. API*	
53	VISCOSITY AT SSU* BURNER SSF	
44	TOTAL HYDROGEN % wt	11.5
41	Btu per lb	18,900

	GAS a	% VOL
54	CO	
55	CH_4 METHANE	28.31
56	~~C_2H_2 ACETYLENE~~ C3	5.33
57	C_2H_4 ~~ETHYLENE~~	4.37
58	C_2H_6 ETHANE	5.94
59	H_2S	0.002
60	~~CO_2~~ C5	1.57
61	H_2 HYDROGEN	53.09
	TOTAL	
	TOTAL HYDROGEN % wt	16.69
62	DENSITY 68 F ATM. PRESS.	
63	Btu PER CU FT	948
41	Btu PER LB	25,150

64 INPUT-OUTPUT EFFICIENCY OF UNIT % $\frac{\text{ITEM 31} \times 100}{\text{ITEM 29}}$ 85

	HEAT LOSS EFFICIENCY	Btu/lb A. F. FUEL	% of A. F. FUEL
65	HEAT LOSS DUE TO DRY GAS	1192	5.5
66	HEAT LOSS DUE TO MOISTURE IN FUEL	-	-
67	HEAT LOSS DUE TO H_2O FROM COMB. OF H_2	1752	8.1
68	HEAT LOSS DUE TO COMBUST. IN REFUSE	-	-
69	HEAT LOSS DUE TO RADIATION	151	0.7
70	UNMEASURED LOSSES	108	0.5
71	TOTAL		14.8
72	EFFICIENCY = (100 – Item 71)		85.2

a - Heat input 56% by oil, 44% by GAS
Combined heating value = 21,570 Btu/lb
b - Oil flow = 1310 lb/hr, GAS flow = 795 lb/hr

*Not Required for Efficiency Testing

† For Point of Measurement See Par. 7.2.8.1-PTC 4.1-1964

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PTC 4.1-b (1964)

CALCULATION SHEET

ASME TEST FORM FOR ABBREVIATED EFFICIENCY TEST

Revised September, 1965

OWNER OF PLANT Getty Mohawk TEST NO. 1 BOILER NO. 81-H1 DATE 8-12-81

30 HEAT OUTPUT IN BOILER BLOW-DOWN WATER = LB OF WATER BLOW-DOWN PER HR × $\left[\dfrac{\text{ITEM 15} - \text{ITEM 17}}{1000}\right]$ = ... kB/hr

24 *If impractical to weigh refuse, this item can be estimated as follows*

DRY REFUSE PER LB OF AS FIRED FUEL = $\dfrac{\text{\% ASH IN AS FIRED COAL}}{100 - \text{\% COMB. IN REFUSE SAMPLE}}$

CARBON BURNED PER LB AS FIRED FUEL = $\dfrac{\overset{\text{ITEM 43}}{81.9}}{100} - \left[\dfrac{\overset{\text{ITEM 22}}{-} \times \overset{\text{ITEM 23}}{-}}{14{,}500}\right] = 0.819$

NOTE: IF FLUE DUST & ASH PIT REFUSE DIFFER MATERIALLY IN COMBUSTIBLE CONTENT, THEY SHOULD BE ESTIMATED SEPARATELY. SEE SECTION 7, COMPUTATIONS.

25 DRY GAS PER LB AS FIRED FUEL BURNED = $\dfrac{11CO_2 + 8O_2 + 7(N_2 + CO)}{3(CO_2 + CO)}$ × (LB CARBON BURNED PER LB AS FIRED FUEL + $\frac{3}{8}$ S)

$$= \frac{11 \times \overset{\text{ITEM 32}}{11.7} + 8 \times \overset{\text{ITEM 33}}{2.6} + 7\left(\overset{\text{ITEM 35}}{85.7} + \overset{\text{ITEM 34}}{-}\right)}{3 \times \left(\overset{\text{ITEM 32}}{11.7} + \overset{\text{ITEM 34}}{-}\right)} \times \left[\overset{\text{ITEM 24}}{0.819} + \frac{\overset{\text{ITEM 47}}{0.26}}{267}\right] = 17.5$$

36 EXCESS AIR† $= 100 \times \dfrac{O_2 - \frac{CO}{2}}{.2682N_2 - (O_2 - \frac{CO}{2})} = 100 \times \dfrac{\text{ITEM 33} - \frac{\text{ITEM 34}}{2}}{.2682\,(\text{ITEM 35}) - (\text{ITEM 33} - \frac{\text{ITEM 34}}{2})} = 12.8$

	HEAT LOSS EFFICIENCY	Btu/lb AS FIRED FUEL	$\frac{\text{LOSS}}{\text{HHV}}$ × 100 =	LOSS %
65	HEAT LOSS DUE TO DRY GAS = LB DRY GAS PER LB AS FIRED FUEL × C_p × ($t_{lvg} - t_{air}$) = ITEM 25 17.5 × 0.24 (ITEM 13) − (ITEM 11) 384 − 100 = ...	1192	$\frac{65}{41}$ × 100 =	5.5
66	HEAT LOSS DUE TO MOISTURE IN FUEL = LB H_2O PER LB AS FIRED FUEL × [(ENTHALPY OF VAPOR AT 1 PSIA & T GAS LVG) − (ENTHALPY OF LIQUID AT T AIR)] = $\frac{\text{ITEM 37}}{100}$ × [(ENTHALPY OF VAPOR AT 1 PSIA & T ITEM 13) − (ENTHALPY OF LIQUID AT T ITEM 11)] = ...	—	$\frac{66}{41}$ × 100 =	—
67	HEAT LOSS DUE TO H_2O FROM COMB. OF H_2 = $9H_2$ × [(ENTHALPY OF VAPOR AT 1 PSIA & T GAS LVG) − (ENTHALPY OF LIQUID AT T AIR)] = 9 × $\frac{\text{ITEM 44}}{100}$ × [(ENTHALPY OF VAPOR AT 1 PSIA & T ITEM 13) 1234.4 − (ENTHALPY OF LIQUID AT T ITEM 11) 68] = ...	1752	$\frac{67}{41}$ × 100 =	8.1
68	HEAT LOSS DUE TO COMBUSTIBLE IN REFUSE = ITEM 22 ...... × ITEM 23 ...... = ...	—	$\frac{68}{41}$ × 100 =	—
69	HEAT LOSS DUE TO RADIATION* = $\dfrac{\text{TOTAL BTU RADIATION LOSS PER HR}}{\text{LB AS FIRED FUEL} - \text{ITEM 28}}$	151	$\frac{69}{41}$ × 100 =	0.7
70	UNMEASURED LOSSES **	108	$\frac{70}{41}$ × 100 =	0.5
71	TOTAL	3203	......	14.8
72	EFFICIENCY = (100 − ITEM 71)	......	......	85.2

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† For rigorous determination of excess air see Appendix 9.2 -- PTC 4.1-1964

* If losses are not measured, use ABMA Standard Radiation Loss Chart, Fig. 8, PTC 4.1-1964

** Unmeasured losses listed in PTC 4.1 but not tabulated above may by provided for by assigning a mutually agreed upon value for Item 70.

SUMMARY SHEET

ASME TEST FORM
FOR ABBREVIATED EFFICIENCY TEST

PTC 4.1-a (1964)

TEST NO. 2
BOILER NO.
DATE 8-13-81
OWNER OF PLANT Getty - Mohawk
LOCATION Bakersfield
TEST CONDUCTED BY Acurex Corp
OBJECTIVE OF TEST Emission Test
DURATION 5 Hrs
BOILER, MAKE & TYPE Two-Drum Zurn Keystone
RATED CAPACITY 60,000 lb/hr
STOKER, TYPE & SIZE
PULVERIZER, TYPE & SIZE
BURNER, TYPE & SIZE
FUEL USED No. 6 oil & Gas
MINE
COUNTY
STATE
SIZE AS FIRED

PRESSURES & TEMPERATURES

1	STEAM PRESSURE IN BOILER DRUM	psia	285
2	STEAM PRESSURE AT S. H. OUTLET	psia	265
3	STEAM PRESSURE AT R. H. INLET	psia	-
4	STEAM PRESSURE AT R. H. OUTLET	psia	-
5	STEAM TEMPERATURE AT S. H. OUTLET	F	495
6	STEAM TEMPERATURE AT R.H. INLET	F	-
7	STEAM TEMPERATURE AT R.H. OUTLET	F	-
8	WATER TEMP. ENTERING (ECON.) (BOILER)	F	98
9	STEAM QUALITY % MOISTURE OR P. P. M.		-
10	AIR TEMP. AROUND BOILER (AMBIENT)	F	100
11	TEMP. AIR FOR COMBUSTION (This is Reference Temperature) †	F	100
12	TEMPERATURE OF FUEL	F	200
13	GAS TEMP. LEAVING (Boiler) (Econ.) (Air Htr.)	F	389
14	GAS TEMP. ENTERING AH (If conditions to be corrected to guarantee)	F	-

UNIT QUANTITIES

15	ENTHALPY OF SAT. LIQUID (TOTAL HEAT)	Btu/lb	380
16	ENTHALPY OF (SATURATED) (SUPERHEATED) STM.	Btu/lb	1262
17	ENTHALPY OF SAT. FEED TO (BOILER) (ECON.)	Btu/lb	65
18	ENTHALPY OF REHEATED STEAM R.H. INLET	Btu/lb	-
19	ENTHALPY OF REHEATED STEAM R. H. OUTLET	Btu/lb	-
20	HEAT ABS/LB OF STEAM (ITEM 16 - ITEM 17)	Btu/lb	1197
21	HEAT ABS/LB R.H. STEAM (ITEM 19 - ITEM 18)	Btu/lb	-
22	DRY REFUSE (ASH PIT + FLY ASH) PER LB AS FIRED FUEL	lb/lb	-
23	Btu PER LB IN REFUSE (WEIGHTED AVERAGE)	Btu/lb	-
24	CARBON BURNED PER LB AS FIRED FUEL	lb/lb	0.815
25	DRY GAS PER LB AS FIRED FUEL BURNED	lb/lb	17.5

HOURLY QUANTITIES

26	ACTUAL WATER EVAPORATED	lb/hr	31700
27	REHEAT STEAM FLOW	lb/hr	-
28	RATE OF FUEL FIRING (AS FIRED wt)	lb/hr	2043 b
29	TOTAL HEAT INPUT $\frac{\text{(Item 28} \times \text{Item 41)}}{1000}$	kB/hr	44070
30	HEAT OUTPUT IN BLOW-DOWN WATER	kB/hr	-
31	TOTAL HEAT OUTPUT $\frac{\text{(Item 26} \times \text{Item 20)} + \text{(Item 27} \times \text{Item 21)}}{1000}$ + Item 30	kB/hr	37,945

FLUE GAS ANAL. (BOILER) (ECON) (AIR HTR) OUTLET

32	CO_2	% VOL	11.6
33	O_2	% VOL	2.5
34	CO	% VOL	-
35	N_2 (BY DIFFERENCE)	% VOL	85.9
36	EXCESS AIR	%	12.2

FUEL DATA

	COAL AS FIRED PROX. ANALYSIS	% wt
37	MOISTURE	
38	VOL MATTER	
39	FIXED CARBON	
40	ASH	
	TOTAL	
41	Btu per lb AS FIRED	
42	ASH SOFT TEMP.* ASTM METHOD	

	OIL	
51	FLASH POINT F*	
52	Sp. Gravity Deg. API*	
53	VISCOSITY AT SSU* BURNER SSF	
44	TOTAL HYDROGEN % wt	12.18
41	Btu per lb	19,170

	COAL OR OIL AS FIRED ULTIMATE ANALYSIS a	
43	CARBON	86.01
44	HYDROGEN	12.18
45	OXYGEN	0.65
46	NITROGEN	0.63
47	SULPHUR	0.47
40	ASH	-
37	MOISTURE	-
	TOTAL	

	GAS a	% VOL
54	CO	
55	CH_4 METHANE	29.7
56	C3 ~~C_2H_2 ACETYLENE~~	5.63
57	~~C_2H_4 ETHYLENE~~ C4	3.58
58	C_2H_6 ETHANE	5.9
59	H_2S	0.003
60	~~CO_2~~ C5	0.81
61	H_2 HYDROGEN	53.62
	TOTAL	
	TOTAL HYDROGEN % wt	17.03
62	DENSITY 68 F ATM. PRESS.	
63	Btu PER CU FT	883
41	Btu PER LB	25,530

	COAL PULVERIZATION	
48	GRINDABILITY INDEX*	
49	FINENESS % THRU 50 M*	
50	FINENESS % THRU 200 M*	

64	INPUT-OUTPUT EFFICIENCY OF UNIT %	$\frac{\text{ITEM 31} \times 100}{\text{ITEM 29}}$	86

	HEAT LOSS EFFICIENCY	Btu/lb A. F. FUEL	% of A. F. FUEL
65	HEAT LOSS DUE TO DRY GAS	1214	5.6
66	HEAT LOSS DUE TO MOISTURE IN FUEL	-	-
67	HEAT LOSS DUE TO H_2O FROM COMB. OF H_2	1792	8.2
68	HEAT LOSS DUE TO COMBUST. IN REFUSE	-	-
69	HEAT LOSS DUE TO RADIATION	153	0.7
70	UNMEASURED LOSSES	109	0.5
71	TOTAL		15
72	EFFICIENCY = (100 - Item 71)		85

a - Heat input 56% by oil, 44% by gas
combined heating value = 21,845 Btu/lb

b - Oil flow = 1310 lb/hr, gas flow = 733 lb/hr

* Not Required for Efficiency Testing

† For Point of Measurement See Par. 7.2.8.1-PTC 4.1-1964

PTC 4.1-b (1964)

ASME TEST FORM
FOR ABBREVIATED EFFICIENCY TEST

CALCULATION SHEET

Revised September, 1965

OWNER OF PLANT GETTY MOHAWK TEST NO. 2 BOILER NO. 81-141 DATE 8-13-81

30 HEAT OUTPUT IN BOILER BLOW-DOWN WATER = LB OF WATER BLOW-DOWN PER HR × $\left[\dfrac{\text{ITEM 15} \ldots - \text{ITEM 17} \ldots}{1000}\right]$ = ... kB/hr

24 *If impractical to weigh refuse, this item can be estimated as follows*

DRY REFUSE PER LB OF AS FIRED FUEL = $\dfrac{\text{\% ASH IN AS FIRED COAL}}{100 - \text{\% COMB. IN REFUSE SAMPLE}}$

CARBON BURNED PER LB AS FIRED FUEL = $\dfrac{\text{ITEM 43: } 81.5}{100} - \left[\dfrac{\text{ITEM 22: } - \times \text{ITEM 23: } -}{14{,}500}\right] = 0.815$

NOTE: IF FLUE DUST & ASH PIT REFUSE DIFFER MATERIALLY IN COMBUSTIBLE CONTENT, THEY SHOULD BE ESTIMATED SEPARATELY. SEE SECTION 7, COMPUTATIONS.

25 DRY GAS PER LB AS FIRED FUEL BURNED = $\dfrac{11CO_2 + 8O_2 + 7(N_2 + CO)}{3(CO_2 + CO)}$ × (LB CARBON BURNED PER LB AS FIRED FUEL + $\frac{3}{8}$ S)

$$= \frac{11 \times \overset{\text{ITEM 32}}{11.6} + 8 \times \overset{\text{ITEM 33}}{2.5} + 7\left(\overset{\text{ITEM 35}}{85.9} + \overset{\text{ITEM 34}}{-}\right)}{3 \times \left(\overset{\text{ITEM 32}}{11.6} + \overset{\text{ITEM 34}}{-}\right)} \times \left[\overset{\text{ITEM 24}}{0.815} + \frac{\overset{\text{ITEM 47}}{0.28}}{267}\right] = 17.5$$

36 EXCESS AIR † $= 100 \times \dfrac{O_2 - \frac{CO}{2}}{.2682N_2 - (O_2 - \frac{CO}{2})} = 100 \times \dfrac{\text{ITEM 33} - \frac{\text{ITEM 34}}{2}}{.2682\,(\text{ITEM 35}) - (\text{ITEM 33} - \frac{\text{ITEM 34}}{2})} = 12.2$

	HEAT LOSS EFFICIENCY	Btu/lb AS FIRED FUEL	$\frac{\text{LOSS}}{\text{HHV}} \times 100 =$	LOSS %
65	HEAT LOSS DUE TO DRY GAS = LB DRY GAS PER LB AS FIRED FUEL × C_p × ($t_{lvg} - t_{air}$) = ITEM 25 17.5 × 0.24 (ITEM 13) − (ITEM 11) 389 − 100 = ... Unit	1214	$\frac{65}{41} \times 100 =$	5.6
66	HEAT LOSS DUE TO MOISTURE IN FUEL = LB H_2O PER LB AS FIRED FUEL × [(ENTHALPY OF VAPOR AT 1 PSIA & T GAS LVG) − (ENTHALPY OF LIQUID AT T AIR)] = $\frac{\text{ITEM 37}}{100}$ × [(ENTHALPY OF VAPOR AT 1 PSIA & T ITEM 13) − (ENTHALPY OF LIQUID AT T ITEM 11)] = ...	−	$\frac{66}{41} \times 100 =$	−
67	HEAT LOSS DUE TO H_2O FROM COMB. OF H_2 = $9H_2$ × [(ENTHALPY OF VAPOR AT 1 PSIA & T GAS LVG) − (ENTHALPY OF LIQUID AT T AIR)] = 9 × $\frac{\text{ITEM 44}}{100}$ × [(ENTHALPY OF VAPOR AT 1 PSIA & T ITEM 13) 1237 − (ENTHALPY OF LIQUID AT T ITEM 11) 68] = ...	1792	$\frac{67}{41} \times 100 =$	8.2
68	HEAT LOSS DUE TO COMBUSTIBLE IN REFUSE = ITEM 22 ...... × ITEM 23 ...... = ...	−	$\frac{68}{41} \times 100 =$	−
69	HEAT LOSS DUE TO RADIATION* = $\dfrac{\text{TOTAL BTU RADIATION LOSS PER HR}}{\text{LB AS FIRED FUEL — ITEM 28}}$	153	$\frac{69}{41} \times 100 =$	0.7
70	UNMEASURED LOSSES **	109	$\frac{70}{41} \times 100 =$	0.5
71	TOTAL	3268	......	15.0
72	EFFICIENCY = (100 − ITEM 71)	......	......	85.0

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† For rigorous determination of excess air see Appendix 9.2 – PTC 4.1-1964

* If losses are not measured, use ABMA Standard Radiation Loss Chart, Fig. 8, PTC 4.1-1964

** Unmeasured losses listed in PTC 4.1 but not tabulated above may by provided for by assigning a mutually agreed upon value for Item 70.

SECTION 4

SAMPLING DATA SHEETS

4.1 CONTINUOUS MONITORING EMISSION DATA

4.2 FIELD DATA SHEETS FOR METHOD 5/17

4.3 FIELD DATA SHEETS FOR SASS

4.4 FIELD DATA SHEETS FOR CONTROLLED CONDENSATION

4.5 FIELD DATA SHEETS FOR AMMONIA

4.1 CONTINUOUS MONITORING EMISSION DATA

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ACUREX Aerotherm

FIELD DATA SHEET

Baseline Test #1

Plant Getty - Mohawk
Location 81-H1 Outlet
Operator Bert
Date 8-11-81
Load Range

Ambient Temperature
Barometric Pressure
Static Pressure Duct
Fuel Refinery gas/fuel oil/hydrogen

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY NO_x			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ~~%~~ ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CO2 ~~NO~~ ppm	CO ~~NO_x~~ ppm	[illegible] ppm	Total HC	Methane	Non-Methane HC			
1240				2.7	11.7	22			232		11.5	21.6	228						
1250				2.7	11.7	22			237		11.5	21.6	233						
1300				2.7	11.8	22			238		11.6	21.6	234						
1310				2.7	11.6	23			237		11.4	22.6	233						
1320				2.7	11.6	23			236		11.4	22.6	233						
1330				2.8	11.6	22			236		11.5	21.7	233						
1340				2.7	11.6	60			235		11.4	59.0	231						
1350				2.6	11.6	102			196	}	11.3 not	99.7 used	192 in average						
1400				3.4	11.3	85			199		11.5	86.9	203						
1410				3.3	11.3	57			235.		11.5	58.0	239						
1420				3.0	11.1	51			239		11.1	51.0	239						
1430				3.0	10.9	47			237		10.9	47.0	237						
1440	Stop																		
				0.0	0.0	+7			0										zero
				7.4	16.6	780			840										span
				7.45	17.6	725+50			867										span gas value
		avg.		2.8	11.5	45			236										
	calibration corr. avg			2.8	12.1	45			242										
1510	Test #1 Cont.			2.7	11.7	37			243		11.5	36.4	288						
1520				2.8	11.8	36			244		11.7	35.6	241						
1530				2.8	11.8	37			244		11.7	36.6	241						
1540				2.8	11.8	34			242		11.7	33.6	239						
1550				2.8	11.8	33			243		11.7	32.6	240						
																			AVERAGE

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Acurex Aerotherm

FIELD DATA SHEET

Baseline Test #1 (Cont.)

Plant Getty - Mohawk
Location 81-41 Outlet
Operator Bost
Date 8-11-81
Load Range

Ambient Temperature
Barometric Pressure
Static Pressure Duct
Fuel

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ~~%~~ ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CO_2 ~~NO~~ ppm	CO ~~NO_x~~ ppm	NO_x ~~NO_2~~ ppm	Total HC	Methane	Non-Methane HC			
1600				2.7	11.8	33			243		11.6	32.5	239						
1610				2.8	11.7	33			242		11.6	32.6	239						
1620				2.7	11.7	33			241		11.5	32.5	237						
1630				2.8	11.6	33			240		11.6	33.6	237						
1640				Remove CM probe to install SASS probe															
1650				2.6	11.7	29			242		11.4	28.4	237						
1700				2.6	11.7	29			242		11.4	28.4	237						
1710				2.7	11.7	29			237		11.6	28.5	233						
1720				3.0	11.6	29			234		11.6	29.0	234						
1730				2.9	11.7	25			237		11.6	24.8	235						
1740				2.8	11.8	25			237		11.7	24.7	234						
1750				3.0	11.9	27			235		11.8	27.0	235						
1800				3.1	11.9	30			234		11.9	30.1	235						
1810				3.1	11.8	30			235		11.8	30.1	236						
1820				3.1	11.8	28			236		11.8	28.1	237						
1830				3.0	11.8	28			237		11.8	28.0	237						
1840				2.8	11.8	24			239		11.7	23.7	236						
1850	End																		
				0.0	0.1	72			710										zero
				7.3	17.6	775			868										span
				7.45	17.6	725±50			867										span gas value
	avg			2.8	11.8	31			239										
	no cal. corr. needed																		
																			AVERAGE

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FIELD DATA SHEET

Baseline Test #2

Plant Getty - Mohawk

Location 81-H1 outlet

Operator Best

Date 8-12-81

Load Range

Ambient Temperature

Barometric Pressure

Static Pressure Duct

Fuel Refinery gas / fuel oil / hydrogen

				DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)					
Time	Sample Point	Load MW	Steam Flow lb/hr x1000	O_2 %	CO_2 %	CO ~~%~~ ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	Co2 ppm	CO ~~NO_x~~ ppm	Nox ~~NO_2~~ ppm	Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
1300				2.4	11.6	28			252		11.2	27.1	244						
1310				2.4	11.6	25			254		11.2	24.2	246						
1320				2.3	11.5	30			250		11.1	28.9	240						
1330				2.4	11.4	32			250		11.0	31.0	242						
1340				2.3	11.4	32			249		11.0	30.8	239						
1350				2.4	11.4	30			247		11.0	29.0	239						
1400				2.3	11.5	28			245		11.1	26.9	236						
1410				2.4	11.4	28			245		11.0	27.1	237						
1420				2.4	11.3	30			275		10.9	29.0	265						
1430				2.4	11.5	30			245		11.1	29.0	237						
1440				2.4	11.5	25			246		11.1	24.2	238						
1450				2.9	11.5	24			248		11.2	23.3	241						
1500				2.5	11.5	24			248		11.2	23.3	241						
1510				2.5	11.4	25			248		11.1	24.3	241						
1520				2.5	11.4	24			247		11.1	23.3	240						
1530				2.5	11.4	21			250		11.1	20.4	243						
1540				2.5	11.6	21			252		11.3	20.4	245						
1550				2.5	11.6	20			257		11.3	19.5	245						
1600				2.5	11.6	20			253		11.3	19.5	246						
1610				2.5	11.6	20			254		11.3	19.5	247						
1630				2.4	11.6	20			253		11.2	19.4	245						
1640				2.4	11.6	18			255		11.2	17.4	247						
1650				2.3	11.7	22			257		11.2	21.2	247						
1700				2.4	11.6	30			253		11.2	29.0	245						
																			AVERAGE

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Acurex Aerotherm

FIELD DATA SHEET

Baseline Test #2 (Cont.)

Plant Getty - Mohawk
Location 81-H1 Outlet
Operator Best
Date 8-12-81
Load Range

Ambient Temperature
Barometric Pressure
Static Pressure Duct
Fuel

				DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)					
Time	Sample Point	Load MW	Steam Flow lb/hr x1000	O_2 %	CO_2 %	CO ~~dry~~ ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CO_2 ~~NO~~ ppm	CO ~~NO_x~~ ppm	NOx ~~NO_2~~ ppm	Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
1710				2.4	11.5	33			253		11.1	31.9	245						
1720				2.4	11.5	32			252		11.1	31.0	244						
1730				2.3	11.6	33			255		11.1	31.7	245						
1740				2.4	11.5	34			255		11.1	32.9	247						
1750				2.4	11.5	35			254		11.1	33.9	246						
1800				2.4	11.5	38			255		11.1	36.8	247						
1810				2.5	11.5	38			253		11.2	37.0	246						
1820				2.5	11.4	37			257		11.1	36.0	250						
1830				2.5	11.3	38			258		11.0	37.0	251						
1840				2.5	11.5	40			258		11.2	38.9	251						
1850				2.5	11.6	40			260		11.3	38.9	253						
1900				2.5	11.6	40			262		11.3	38.9	255						
1910				2.5	11.7	40			260		11.4	38.9	253						
1920				2.5	11.8	41			262		11.5	39.9	255						
1930				2.5	11.8	44			262		11.5	42.8	255						
1940				2.6	11.8	44			262		11.5	43.0	256						
1960				2.6	11.8	44			262		11.5	43.0	256						
2000				2.6	11.8	46			262		11.5	45.0	256						
2010				2.6	11.8	45			262		11.5	44.0	256						
2020				2.5	11.8	45			264		11.5	43.8	257						
2030				2.5	11.6	45			263		11.3	43.8	256						
~~2040~~																			
~~2050~~				+0.1	-.2	+30			+3										zero
~~2100~~				7.2	17.5	828			927										span
				7.45	17.6	725+50			867										span gas value
																			AVERAGE
		avg.		2.45	11.6	32			254										
	cal corr. avg			2.5	11.7	30			239										

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ACUREX Aerotherm

FIELD DATA SHEET

Low NOx Test #1 "Restart"

Plant Getty - Mohawk
Location 81 H-1
Operator Best
Date 8-13-81
Load Range

Ambient Temperature
Barometric Pressure
Static Pressure Duct
Fuel

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ~~ppm~~	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CO_2 ppm	CO ~~NO_x~~ ppm	NO_x ~~NO_2~~ ppm	Total HC	Methane	Non-Methane HC			
1440				2.7	11.6	35		150			11.4	34.4	148						System run w/o
1450				2.7	11.6	24		151			11.4	23.6	148						NH_3 "scrubber"
1500				2.6	11.6	22		161			11.3	21.5	148						
1510				2.6	11.7	21		152			11.4	20.5	149						System run with
1520				2.6	11.6	20		151			11.3	19.6	148						Balston filter &
1530				2.6	11.6	20		151			11.3	19.6	148						Moly converter in
1540				2.6	11.6	20		151			11.3	19.6	148						use
1550				2.6	11.7	20		152			11.4	19.6	149						Moly on NO_x mode
1600				2.6	11.8	21		150			11.5	20.5	147						TECO 10 on "NO mode
1610				2.6	11.8	21		150			11.5	20.5	147						
1620				2.6	11.8	21		153			11.5	20.5	150						→ increase NH_3 flowrate
1630				2.6	11.8	24		151			11.5	23.5	148						
1640				2.5	11.8	25		150			11.5	24.3	146						
1650				2.5	11.9	28		160			11.6	27.2	146						
1700				2.5	11.9	30		150			11.6	29.2	146						
1710				2.5	11.8	40		150			11.5	38.9	146						
1720				2.5	11.7	60		148			11.4	58.4	144						
1730				2.6	11.6	75		147			11.3	73.3	144						
1740				2.5	11.6	85		148			11.3	82.7	144						
1750				2.5	11.6	95		150			11.3	92.4	146						
1800				2.6	11.6	100		142			11.3	97.8	139						
1810				2.6	11.7	100		143			11.4	97.8	140						→ end CO gas 1835
1820				2.6	11.8	105		143			11.5	102.7	140						
1830																			
																			AVERAGE

CO #'s not used in avg.

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ACUREX Aerotherm

FIELD DATA SHEET

Low NOx Test #1

Plant Getty - Mohawk

Location 81-H1

Operator Best

Date 8-13-81

Load Range

Ambient Temperature

Barometric Pressure

Static Pressure Duct

Fuel

				DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)					
Time	Sample Point	Load MW	Steam Flow lb/hr x1000	O_2 %	CO_2 %	CO ~~%~~ ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CO_2 ~~NO~~ ppm	CO ~~NO_x~~ ppm	NOx ~~NO_2~~ ppm	Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
1840				2.0	11.8	25		146			11.5	24.4							
1850				2.6	11.6	30		147			11.3	29.3							
1900				2.6	11.5	30		148			11.2	29.3							
1910				2.5	11.6	30		152			11.3	29.2							
1920				2.5	11.7	32		162			11.4	31.1							
1930				2.5	11.7	30		154			11.4	31.7							
1940				2.5	11.8	24		150			11.5	23.3							
1950				2.6	11.9	17		153			11.6	16.6							
2000				2.7	11.7	13		155			11.5	12.8							
2010				2.8	11.6	25		149			11.5	24.7							
2020				2.8	11.5	25		145			11.4	24.7							
2030				2.8	11.5	24		147			11.4	24.7							
2040				2.8	11.5	23		147			11.4	22.7							
2050				2.7	11.6	20		147			11.4	19.7							
2100				2.7	11.6	19		150			11.4	18.7							
2110				2.7	11.7	22		152			11.5	21.6							
2120				2.7	11.7	25		152			11.5	24.6							
2130				2.8	11.6	26		155			11.5	25.7							
2140				2.8	11.7	28		159			11.6	27.7							
2150				2.8	11.6	30		162			11.5	29.7							
2157	End																		
				+.1	+.2	+8		0											zero
				7.7	17.7	810		927											span
				7.45	17.6	225+50		867											span gas value
																			AVERAGE
			avg.	2.6	11.7	25		150											
	cal corr. avg			2.5	11.6	24		141											

UREX Aerotherm

FIELD DATA SHEET

Low NOx test #2

Plant Getty Mohawk
Location 81-H
Operator Best
Date 8-14-81
Load Range

Ambient Temperature
Barometric Pressure
Static Pressure Duct
Fuel

				DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)					
Time	Sample Point	Load MW	Steam Flow lb/hr x1000	O2 %	CO2 %	CO ppm	SO2 ppm	NO ppm	NOx ppm	NO2 ppmn	CO2 ~~NO~~ ppm	Co ~~NOx~~ ppm	NOx ~~NO2~~ ppm	Total HC	Methane	Non-Methane HC	H2O %	Stack Gas Temp °F	COMMENTS
0940	Start			2.6	10.5	30		226			10.3	29.3	221						→ No NH3 injection
0950				2.6	10.4	30		237	(0957)		10.2	29.3	232						NH3 injection at 0957
~~[illegible]~~																			Run #1
1005 ~~1010~~				2.6	10.4	30		151			10.2	29.3	148						
1010 ~~1020~~				2.6	10.4	37		153			10.2	30.3	150						
1020 ~~1030~~				2.6	10.4	30		(138)	* adjusting NH3 flowmeter		10.2	29.3	135						
1020				2.6	10.4	31		(145)	*		10.2	30.3	142						
1030				2.6	10.2	30		135			10.0	30.3	132						
1035				2.6	10.3	31		123			10.1	30.3	120						
1040				2.6	10.3	32		123			10.1	31.3	120						
1045				2.6	10.3	33		123			10.1	32.3	120						
1100				2.7	10.2	31		114			10.0	30.5	112						
1105				2.6	10.2	35		112			10.0	34.2	109						
1115				2.6	10.2	100		137			10.0	97.8	134						
1120				2.7	10.1	65		145			9.9	64.0	141						
1130					adjusting				switched to oil fuel										
1148				2.7	11.0	65		147			10.8	64.0	145						
1150				2.6	11.0	25		146			10.7	24.4	143						
1200				2.6	11.1	33		116			10.8	32.3	113						
1210				2.5	11.0	35		116			10.7	34.0	113						
1220				2.5	10.9	50		109			10.6	48.6	106						
1225				2.5	10.9	52		99			10.6	50.6	96						
1230				2.5	10.9	25		140			10.6	24.3	136						
1240				2.5	10.9	20		234			10.6	19.5	228						
																			AVERAGE
				7.05	-.5	-10		0	averages		11.4	34.1	198						zero
				7.6	16.7	790		862											span
				7.45	17.6	125+50		867											span gas value

Form EED-063 12/78

4.2 FIELD DATA SHEETS FOR METHOD 5/17

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m-5/17 No1

PRELIMINARY VELOCITY TRAVERSE

PLANT MOHAWK
DATE 8-11-81
LOCATION B-2
STACK I.D.
BAROMETRIC PRESSURE, in. Hg 29.59 @ 0930
STACK GAUGE PRESSURE, in. H_2O
OPERATORS PAGE / STIENER

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
SOUTH 1	.09	368
2	.10	369
3	.10	368
4	.10	370
5	.10	368
6	.10	368
7	.09	365
8	.05	361
WEST 1	.07	388
2	.08	358
3	.09	369
4	.10	369
5	.10	368
6	.10	368
7	.09	365
8	.05	362
	$\frac{1.41}{16}$	$\frac{5884}{16}$
	.088	367.75
AVERAGE		

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

EPA (Dur) 233
4/72

M5/17 No 1

Page 1 of 2

FIELD DATA

Plant Mohawk
Date 8-11-81
Sample Location B-2
Sample Type M-5/17
Run Number 1
Operator R. Pape
Ambient Temperature
Barometric Pressure 29.57 @ 0945
Static Pressure, (H_2O) -.07" H_2O
Filter Number(s) MV-142-~~[illegible]~~ 233 [illegible] 5-14-81
37mm Front Filter, NH_4-012+010 used 2 each 47mm filters
Leak Check: Initial at 20 " Hg, ~~[illegible]~~ 0.014 CFM from nozzle,
Final at 21 " Hg, 0.017 CFM from M17 filter
Pitot Leak Check: OK Initial
OK Final ΔP

Impinger Volumes Initial	Final	Net Gain
1-100	247 +82	229
2-100	124	24
3-MT	4	4
	Silica Gel	
348.8	373	24.2
SASS Condensate		
Total Volume		281.2

Probe Length and Type 5' Glass
Nozzel Size & I.D. 812 - .497
Pitot Coefficient & I.D. .785
Assumed Moisture 12
Molecular Weight, Dry, (M_d)
Meter Box Number G9
Meter Coefficient .726/.994
α Factor .994
K =
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

46.146(X) =

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F							Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
					Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	Gas Meter In	Gas Meter Out		
	0	1100	Init. 85.018												
South 1	5	1105	89.65	.09	2.76	2.75	368	253	~~253~~	Z	256	89	88	6	.300
2	10	1110	94.30	.10	3.06	3.1	369	250			251	90	89	7	.316
3	15		99.28	.10	3.06	3.1	368	255			262	91	88	9	.316
4	20		103.86	.10	3.06	3.1	370	256			252	92	89	9	.316
5	25		108.82	.10	3.06	3.1	368	256			255	92	88	11	.316
6	30		113.61	.10	3.06	3.0	368	253			256	93	90	14	.316
7	35		118.11	.09	2.76	2.75	365	255			260	93	89	15	.300
8	40	1140	121.828	.05	1.51	1.5	361	258			255	93	90	13	.224

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Comments: Start traverse with probe all the way in. First half Final leak rate .015 cfm @ 16" Hg
change M17 filter between sample ports

M-5/17 No

Page 2 of 2

MS-17 R.Pgn Pgzdz Test 1

Traverse Point Number	Sampling Time, min / Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O Desired	Orifice Pressure Differential (ΔH), in. H_2O Actual	Temperature °F Stack	Temperature °F Probe	Temperature °F Impinger	Temperature °F Organic Module	Temperature °F Oven	Temperature °F Gas Meter In	Temperature °F Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
	40 / 1239	Init. 122.927												
Lo-1	45	127.02	.07	2.14	2.15	366	258			256	93	91	5	.264
2	50	131.24	.08	2.44	2.45	368	255			253	93	91	6	.282
3	55	135.83	.09	2.75	2.8	369	257			258	94	92	8	.300
4	60	140.62	.10	3.06	3.1	369	256			256	94	92	10	.316
5	65	145.39	.10	3.06	3.1	368	257			258	95	93	13	.316
6	70	150.23	.10	3.06	3.0	368	255			259	95	93	15	.316
7	75	154.65	.09	2.75	2.75	365	253			255	96	94	18	.300
8	80	156.363	.05	1.53	1.55	362	256			254	96	94	12	.223
		73.365	.088		2.706	367.75	255				91.88			.295

Run No. 1

Date 8-11-81

Sampling Location Mohawk 81-1

Comments: Initial Leak Rate 2nd half .009 cfm at 18" Hg
Final .017 at 21

m-5/17 No 1

ISOKINECTIC NOZZLE CALCULATION
AND
SAMPLING RATE CALCULATION

Plant Mohawk

Performed by

Date 8-11-81

Sample Location 81-1

Test No./Type 1 M5

$$N_d = \left(\frac{\Delta H \; T_s}{K \; T_m \; \Delta P}\right)^{.25}$$

where: N_d = Nozzel diameter (inches)

Average pressure differential across the orifice meter (in. H_2O)	ΔH	1.8
Temperature stack gas, average (^0F)	T_s	365
Temperature of gas meter, average (^0F)	T_m	100
Stack gas velocity pressure (in H_2O)	ΔP	.1
$\left(\frac{(1.8)\;(\overset{825}{365}+460)}{(\underset{328}{756})\;(100+460)(.1)}\right)^{.25}$	N_d	.433

$$\Delta H = K\,(N_d)^4\,\frac{T_m}{T_s}\,(\Delta P)$$

where: ΔH = Pressure differential across the orifice meter (in H_2O)

Nozzel diameter, actual (inches)	N_d	P12 .497	.379
Temperature of gas meter (^0F)	T_m	100	
Temperature of stack gas (^0F)	T_s	365	
Stack gas velocity pressure (in H_2O)	ΔP	.1	
$\left(\overset{328}{(756)}\,(.497)^4\,\frac{(100+460)}{(365+460)}\,(.1)\right)$	ΔH	3.1	1.06
Magic number ______$(\quad)^4$	$K(N_d)^4$	46.146	15.605

m-5/17 Nº 1

ISOKINECTIC SAMPLING WORKSHEET

Plant Mohawk

Peformed by R. Page

Date 8-11-81

Sample Location 81-1

Test No./Type 1-M5

$$K = \frac{782.687\ (Cp)^2\ (1-B_{wo})^2\ P_s\ M_d}{K_o^2\ M_s\ P_m}$$

where: K = Contant of fixed and assumed parameters (dimensionless)

Pitot coefficient (dimensionless)	C_p	.785
Water vapor in the gas stream (proportion by volume)	B_{wo}	.12
Absolute stack gas pressure (in. Hg)	P_s	29.59
Molecular weight, stack gas dry (lb/lb-mole)	M_d	32.16
Orifice coefficient (dimensionless)	K_o	.726
Molecular weight, stack gas wet (lb/lb-mole) $M_d(1-B_{wo}) + 18(B_{wo})$	M_s	30.00
Abolute meter pressure (in. Hg)	P_m	29.72
$\frac{782.687\ (.785)^2\ (1-\overset{.88}{.12})^2\ (29.59)\ (32.16)}{(.726)^2\ (30)\ (29.72)}$	K	756.328

m-5/17 no 1

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant Mohawk

Performed by DaRos

Date 8-11-81

Sample Location R-2

Test No./Type 1/M-5/17

Barometric Pressure (in. Hg)	P_b	29.57
Meter volume (std), $17.64\left(\frac{V_m}{\alpha}\right)\left(\frac{P_b+\frac{\Delta H}{13.6}}{T_m+460}\right)$ $17.64\left(\frac{(73.365)}{(.994)}\right)\left(\frac{(29.59)+\frac{(2.706)}{13.6}}{(71.88)+460}\right)\frac{29.7889}{551.88}$	$V_{m\ std}$	70.277
Volume of liquid collected (grams)	Vl_c	281.2
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	$V_{w\ std}$	13.236
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std}+V_{m\ std}}, \frac{(13.236)}{(13.236)+(70.277)}$	B_{wo}	.158
Molecular weight, stack gas dry (lb/lb-mole) (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28) (12.0 x 0.44) + (2.7 x 0.32) + (85.3 + ___ x 0.28) From Carlo Castaldini - Acurex	M_d	30.028
Molecular weight, stack gas wet (lb/lb-mole) $Md(1-B_{wo}) + 18(B_{wo})$, (30.028)(1-.158) + 18(~~30.028~~ .158	M_s	28.13
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (\text{in. } H_2O)}{13.6}, (29.59) + \frac{-(.07)}{13.6}$	P_s	29.58

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m-6/n N°1

Temperature stack gas, average (^oF)	T_s	367.75
Stack velocity (fps) $85.49\ (C_p)\ (\sqrt{\Delta P_{s\ avg}})\ \sqrt{\frac{T_s avg + 460}{P_s \quad M_s}}$ $85.49\ (\underline{.785})(\sqrt{\underline{.295}})\ \sqrt{\frac{(\underline{367.75}) + 460}{(\underline{29.58})(\underline{28.13})}}$	$V_{s(avg)}$	19.746
Total sample time (minutes)	θ	80
Nozzle diameter, actual (inches)	N_d	P-12 .497
Percent isokinetic (%) $\frac{17.33\ (T_s + 460)(V_w \text{ std} + V_m \text{ std})}{\theta \quad V_s \quad P_s \quad N_d^2}$ $\frac{17.33\ (\underline{367.8} + 460)((\underline{15.236}) + (\underline{70.27}))}{(\underline{80})(\underline{19.746})(\underline{29.58})(\underline{.497})^2}$	%I	103.80
Area of stack (ft^2) $\pi = 3.1416$ 45.5 "Diam $\pi r^2 \div 144, \quad \pi(\underline{\quad})^2 \div 144$	A_s	11.281
Stack gas volume at standard conditions (dscfm) $60\ (1 - B_{wo}) Vs_{avg}\ A_s \left(\frac{528}{T_s \text{ avg} + 460}\right) \left(\frac{Ps}{29.92}\right)$ $60\ (1 - \underline{.158})(\underline{19.746})(\underline{11.281})\left(\frac{528}{\underline{367.75} + 460}\right) \left(\frac{(\underline{29.58})}{(29.92)}\right)$	Q_s	7,098.9
Particulate matter concentration, dry (gr/dscf) $15.432\ \frac{M_p(\text{grams})}{Vm_{std}}, \quad 15.432\ \frac{(\underline{\quad\quad})}{(\underline{\quad\quad})}$	$C_{s(std)}$	
Emission rate of particulate matter (lb/hr) $0.00857\ (Q_s)\ C_{s(std)}, \quad 0.00857\ (\underline{\quad\quad})(\underline{\quad\quad})$	E_p	

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FIELD DATA

Page 1 of 2

Plant MOHAWK
Date 8-13-81
Sample Location B-2 unit 81
Sample Type M-5/17
Run Number 2
Operator R PAPE
Ambient Temperature 95
Barometric Pressure 29.42
Static Pressure, (H_2O) -0.1" H_2O
Filter Number(s) MV-142-225
NH4-015, NH4-013

Leak Check: Initial at 18 " Hg, .014 CFM
2nd Filter Final at 18 " Hg, .016 CFM
Pitot Leak Check: OK initial
OK Final

Impinger Volumes

Initial	Final	Net Gain
~~100~~		
100		270 ml
MT		

Pitch Lab Data
M. chips
9-15-82

Silica Gel

	Initial	Final	Net Gain
with Jon	346.3	373.4	27.1

SASS Condensate

Total Volume

Probe Length and Type 5' Glass
Nozzel Size & I.D. P12 .497"
Pitot Coefficient & I.D. 785
Assumed Moisture 12
Molecular Weight, Dry, (M_d)
Meter Box Number 084
Meter Coefficient .693
α Factor 1.011
K =
$K(Nd)^4 = \_\_ \times (\_\_)^4 = \_\_$
$\Delta H = K(N_d)^4 \left(\frac{T_m}{T_S}\right) (P)$

$46.146 \left(\frac{T_?}{T_S}\right)(\Delta P) = \Delta H$
$30.746 (\Delta P) =$

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3	0-2" gauge Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O Desired	Actual	Temperature °F Stack	Probe	Impinger	Organic Module	Oven	Gas Meter In	Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
	0	1915	Init. 64.500												
E-1	5	1920	68.82	.08	2.45	2.5	373	252	Ice		258	95	94	6	.283
2	10	1925	73.13	.09	2.78	2.8	381	255			252	94	94	6	.300
3	15	1930	77.82	.10	3.07	3.1	385	255			256	94	94	8	.316
4	20	1935	82.35	.10	3.07	3.1	386	254			256	94	94	9	.316
5	25	1940	86.94	.10	3.07	3.1	379	253			256	94	93	11	.316
6	30	1945	91.54	.10	3.07	3.1	386	252	Ice		255	93	93	13	.316
7	35	1950	95.90	.09	2.77	2.8	381	251			259	93	93	13	.300
8	40	1955	99.735	.07	2.15	2.2	269	250			255	93	92	12	.265

-Sunset

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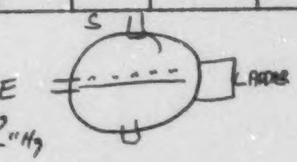
Comments: Start Traverse all the way in
change M17 Filter in between ports
1st Filter Final leak Rate .015 cfm at 17 "Hg
2nd Filter Initial leak Rate .014 cfm at 18 "Hg



4-22

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Ralph Pope M5-17 test 2 Mohawk Refinery 29.94 ΔP = .014

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F					Gas Meter		Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
					Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	In	Out		
	40	2053	Init. 100.175												
8-1	45	2058	103.78	.06	1.80	1.80	379	280			256	86	84	4	.245
2	50	2103	108.17	.09	2.69	2.7	384	252			256	84	84	7	.300
3	55	2108	112.27	.08	2.40	2.4	385	251			257	84	84	6	.283
4	60	2113	116.58	.09	2.69	2.7	385	245			239	83	83	8	.300
5	65	2118	120.94	.10	2.99	3.0	384	336			268	83	83	10	.316
6	70	2123	125.46	.10	2.99	3.0	382	242			271	83	82	12	.316
7	75	2128	130.72	.09	2.69	2.7	379	265			246	82	82	12	.300
8	80	2133	133.390	.06	1.80	1.80	363	246			266	82	82	11	.245
			68.890	.0875	2.655	2.675	373.8	258.7			256.6	88	4		.295

Run No. M5-17 #2

Date 8-13-81

Sampling Location Unit 81-2

Comments:

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant Mohawk
Performed by Chips
Date 8-13-81
Sample Location B-2
Test No./Type 2 / M-5/17

Barometric Pressure (in. Hg)	P_b	29.42
Meter volume (std), $17.64 \left(\frac{V_m}{\alpha}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$ $17.64 \left(\frac{(68.890)}{(1.011)}\right)\left(\frac{(29.42) + \frac{(2.675)}{13.6}}{(88.4) + 460}\right)$	$V_{m\ std}$	64.915
Volume of liquid collected (grams)	Vl_c	297.1
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	$V_{w\ std}$	13.984
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std} + V_{m\ std}} = \frac{(13.984)}{(13.984) + (64.915)}$	B_{wo}	.1772
Molecular weight, stack gas dry (lb/lb-mole) $(\%\ CO_2 \times 0.44) + (\%\ O_2 \times 0.32) + (\%\ N_2 + \%\ CO \times 0.28)$ (___ x 0.44) + (___ x 0.32) + (___ + ___ x 0.28)	M_d	(Test #1) 30.028
Molecular weight, stack gas wet (lb/lb-mole) $Md(1-B_{wo}) + 18(B_{wo})$, (___)(1-___) + 18(___)	M_s	27.896
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (\text{in. } H_2O)}{13.6} = (29.42) + \frac{(-.1)}{13.6}$	P_s	29.41

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Temperature stack gas, average (^oF)	T_s	373.8
Stack velocity (fps) $85.49\ (C_p)\ (\sqrt{\Delta P}_{s\ avg})\ \sqrt{\frac{T_s avg + 460}{P_s\ \ M_s}}$ $85.49\ (\underline{.785})(\sqrt{\overset{.295}{}})\ \sqrt{\frac{(\underline{373.8}) + 460}{(\underline{29.41})(\underset{27.896}{\cancel{28.13}})}}$	$V_{s(avg)}$	~~19.875~~ 19.958
Total sample time (minutes)	θ	80
Nozzle diameter, actual (inches)	N_d	.497
Percent isokinetic (%) $\frac{17.33\ (T_s + 460)(V_w\ std + V_m\ std)}{\theta\ \ \ V_s\ \ \ P_s\ \ \ N_d^2}$ $\frac{17.33\ (\underline{373.8} + 460)((\underline{13.484}) + (\underline{64.915}))}{(\underline{\ 80\ })(\underline{19.958})(\underline{29.41})(\underline{.497})^2}$	%I	98.29
Area of stack (ft^2) π= 3.1416 Diam = 45.5" $\pi r^2 \div 144$, $\pi(\underline{\quad})^2 \div 144$	A_s	11.281
Stack gas volume at standard conditions (dscfm) $60\ (1 - B_{wo})Vs_{avg}\ A_s \left(\frac{528}{T_s\ avg + 460}\right) \left(\frac{Ps}{29.92}\right)$ $60\ (1 - \underline{.1772})(\underline{19.958})(\underline{11.281})\left(\frac{528}{\underline{373.8} + 460}\right)\left(\frac{(\underline{29.41})}{(29.92)}\right)$	Q_s	6,918.5
Particulate matter concentration, dry (gr/dscf) $15.432\ \frac{M_p(grams)}{Vm_{std}}$, $15.432\ \frac{(\underline{\quad\quad})}{(\underline{\quad\quad})}$	$C_{s(std)}$	
Emission rate of particulate matter (lb/hr) $0.00857\ (Q_s)\ C_{s(std)}$, $0.00857\ (\underline{\quad\quad})(\underline{\quad\quad})$	E_p	

7602/5/81/Rev 1

4.3 FIELD DATA SHEETS FOR SASS

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ISOKINECTIC SAMPLING WORKSHEET

Plant MOHAWK
Peformed by HDLM
Date 8-13-81
Sample Location B-2
Test No./Type 1/SASS

$$K = \frac{782.687\ (Cp)^2\ (1-B_{wo})^2\ P_s\ M_d}{K_o^2\ M_s\ P_m}$$

where: K = Contant of fixed and assumed parameters (dimensionless)

Pitot coefficient (dimensionless)	C_p	.812
Water vapor in the gas stream (proportion by volume)	B_{wo}	Assume .15 from M-5 data
Absolute stack gas pressure (in. Hg) $29.44 - (.07/13.6)$	P_s	29.43
Molecular weight, stack gas dry (lb/lb-mole)	M_d	28.13 from M-5 data
Orifice coefficient (dimensionless)	K_o	3.406
Molecular weight, stack gas wet (lb/lb-mole) $M_d(1-B_{wo}) + 18(B_{wo})$	M_s	26.61
Abolute meter pressure (in. Hg) $29.44 + \left(\frac{.768}{13.6}\right)$	P_m	29.50
$\frac{782.687\ (.812)^2\ (1-.15)^2\ (29.43)\ (28.13)}{(3406)^2\ (26.61)\ (29.50)}$	K	33.90

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ISOKINECTIC NOZZLE CALCULATION
AND
SAMPLING RATE CALCULATION

Plant MOHAWK   Performed by HDCM

Date 8-13-81

Sample Location B-2

Test No./Type 1/SASS

$$N_d = \left(\frac{\Delta H\ T_s}{K\ T_m\ \Delta P}\right)^{.25}$$

where: N_d = Nozzel diameter (inches)

Average pressure differential across the orifice meter (in. H_2O)	ΔH	.784
Temperature stack gas, average (^oF)	T_s	384
Temperature of gas meter, average (^oF)	T_m	103
Stack gas velocity pressure (in H_2O)	ΔP	.10
$\left(\frac{(.784)\ (384 + 460)}{(33.9)\ (103 + 460)(0.1)}\right)^{.25}$	N_d	.767

$$\Delta H = K\ (N_d)^4\ \frac{T_m}{T_s}\ (\Delta P)$$

where: ΔH = Pressure differential across the orifice meter (in H_2O)

Nozzel diameter, actual (inches)	N_d*	.748
Temperature of gas meter (^oF)	T_m	103
Temperature of stack gas (^oF)	T_s	384
Stack gas velocity pressure (in H_2O)	ΔP	0.10
$\left((33.9)\ (.748)^4\ \frac{(103 + 460)}{(384 + 460)}\ (0.1)\right)$	ΔH	.708
Magic number ______( )^4	$K(N_d)^4$	

FIELD DATA

Page 1 of 3

Plant MOHAWK
Date 8-12-81
Sample Location B-2
Sample Type SASS
Run Number 1
Operator HDLM II
Ambient Temperature ~95°F
Barometric Pressure 29.44 @ 1055
Static Pressure, (H_2O) −0.07
Filter Number(s) MV-142-232

Impinger Volumes Initial	Final	Net Gain
500	1700	1200
(1000	(3530	1530

Silica Gel

900	2135.7	335.7
900		

SASS Condensate 768.0 @ pH 2.5

Total Volume 3833.7

Probe Length and Type 6' GLASS
Nozzel Size & I.D. .748/P-43 & .574/P-64
Pitot Coefficient & I.D. .812
Assumed Moisture 15%
Molecular Weight, Dry, (M_d) 29.5 Assumed
Meter Box Number 084
Meter Coefficient 3.406
α Factor 1.073
K =
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{TS}\right)$ (P)

Leak Check: Initial at 24 " Hg, .025 CFM
Final at 26 " Hg, .045 CFM
Pitot Leak Check: 0.0

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F					Gas Meter		Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
					Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	In	Out		
	0	1410	Init. 588.844												
	10	1420	608.802	0.10	0.717	N/R	386	400	70	71	401	97	99	4	.316
	20	1430	632.07	0.10	0.717	0.784	385	421	81	59	400	100	100	4	
	33	1443	662.2	0.10	0.717	0.778	385	431	80	59	399	105	102	4	
	40	1450	678.28	0.10	0.717	0.764	384	415	83	59	395	106	102	4	
	50	1500	701.350	0.10	0.717	0.772	384	416	88	58	411	107	103	4	
	60	1510	724.532	0.10	0.717	0.778	384	416	88	59	404	108	104	4	
	70	1522	747.500	0.10	0.717	0.763	384	411	86	57	404	109	104	4	
	80	1532	771.150	0.10	0.717	0.810	383	414	82	58	403	107	102	4	
	90	1542	795.02	0.10	0.717	0.820	383	416	86	59	403	108	102	4	

Comments: 1510 (60 min) DRAIN CONDENSATE

1/ RECOPIED BY DuROS

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Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F					Gas Meter		Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
			Init.		Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	In	Out		
	100	1552	816.942	0.10	0.717	0.695	384	416	91	61	402	108	103	4½	0.316
	110	1602	839.546	0.10	0.717	0.739	385	410	90	61	402	108	103	4½	
	120*	1612	862.526	0.10	0.717	0.764	384	410	88	61	402	107	102	4½	
	130	1623	885.911	0.10	0.717	0.792	384	407	80	61	400	108	104	4½	
	140	1633	908.965	0.10	0.717	0.770	384	407	81	61	402	109	106	4½	
	150	1643	932.150	0.10	0.717	0.778	384	407	81	62	402	107	104	5	
	160	1653	954.890	0.10	0.717	0.749	384	410	84	62	402	107	103	5	
	170	1703	977.500	0.10	0.717	0.740	384	409	90	67	404	107	105	5	
	180*	1713	999.887	0.10	0.717	0.725	384	408	89	68	406	106	102	5½	
	190	1725	1023.942	0.10	0.717	0.857	384	408	76	71	408	106	101	5½	
	200	1735	1047.555	0.10	0.717	0.807	384	408	77	68	408	106	100	5½	
	210	1745	1070.32	0.10	0.717	0.751	384	406	82	67	407	103	99	5½	
	220	1755	1092.50	0.10	0.717	0.712	384	408	83	67	405	104	99	5½	
	230*	1605	1116.612	0.10	0.717	0.841	384	408	84	68	406	100	97	5½	
	240	1630	1148.600	0.10	1.330	1.48	385	399	88	67	405	103	99	10	
	250	1640	1179.005	0.10	1.330	1.34	385	399	88	66	406	104	99	10½	
	260	1650	1210.13	0.10	1.330	1.402	385	409	83	67	407	104	99	11	

* Nozzle change

522768

.771

(103.8)

Run No. SASS-1 (1612)

Date 8-12-81

Sampling Location B-2

Comments:

* 120: 1 minute pause to drain condensate.

* 1605 (230 min.): Δ Silica gel, condensate drained and nozzle to 0.874 inch.

* 1713 (180 min): Drain condensate

M Temp = $\frac{4775}{46}$ = 103.8

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F							Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
			Init.		Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	Gas Meter In	Gas Meter Out		
	270	1700	1240.850	0.10	1.330	1.366	385	400	83	68	407	104	99	11	
	280	1710	1271.44	0.10	1.330	1.365	385	400	83	67	406	105	99	11	
	290	1720	1302.23	0.10	1.330	1.372	386	400	83	68	406	105	99	11 1/2	
	300	1730	1332.74	0.10	1.330	1.348	385	400	88	68	406	102	99	12	
	310	1740	1363.26	0.10	1.330	1.348	385	400	82	68	404	98	97	12	
	320	1752	1393.84	0.10	1.330	1.354	384	401	80	69	407	100	95	12	
	330	1802	1425.05	0.10	1.330	1.410	384	400	81	69	404	101	95	13	
	340	1812	1455.200	0.10	1.330	1.316	384	400	82	69	405	101	96	13	
	350	1822	1486.500	0.10	1.330	1.419	384	401	84	69	404	100	95	13 1/2	
	360	1932	1517.73	0.10	1.330	1.412	384	404	80	69	405	101	94	13 1/2	
	370	1842	1548.67	0.10	1.330	1.386	384	404	84	69	405	100	93	13 1/2	
	380	1852	1579.47	0.10	1.330	1.373	384	404	84	69	405	100	92	13 1/2	
	390	1902	1610.172			END	of		TEST	1					
			1021.328				384.3								

1.379

99.2

Run No. SASS-1 Date 8-12-81 Sampling Location B-2

Comments: 1740 (310 min.) : DRAINED CONDENSATE

NOTE: ALL CLOCK TIMES ARE 2 HOURS OFF: i.e. 1800 hrs is ACTUALLY 2000. S.H.

$\frac{2977}{30} = 99.2$

4-33

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant MOHAWK

Performed by HOLM / DIAROS

Date 8-19-81

Sample Location R-2

Test No./Type 1/SASS

Barometric Pressure (in. Hg)	P_b	27.44
Meter volume (std), $$17.64 \left(\frac{V_m}{\alpha}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$$ SEE ATTACHED SHEET FOR CALCULATIONS $$17.64 \left(\frac{(\underline{\quad})}{\underline{\quad}}\right)\left(\frac{(\underline{\quad}) + \frac{(\underline{\quad})}{13.6}}{(\underline{\quad}) + 460}\right)$$	Ⓐ 0 to 230 MINUTES	453.931
	Ⓑ 230 to 390 MINUTES	428.65
	Ⓒ V_m std 0 to 390 MINUTES	882.581
Volume of liquid collected (grams)	Vl_c	3833.7
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	V_w std Ⓐ	92.81
	Ⓑ	87.64
	Ⓒ	180.45
Stack gas proportion of water vapor $\frac{V_{w\,std}}{V_{w\,std} + V_{m\,std}}, \frac{(180.45)}{(180.45) + (882.581)}$	B_{wo}	.169
Molecular weight, stack gas dry (lb/lb-mole) (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28) (11.7 x 0.44) + (2.6 x 0.32) + (85.7 + ____ x 0.28)	M_d	29.976 1/
Molecular weight, stack gas wet (lb/lb-mole) $Md(1-B_{wo}) + 18(B_{wo})$, (29.976)(1-.___) + 18(.___)	M_s	27.94
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (\text{in. } H_2O)}{13.6}, (29.44) + \frac{(-.07)}{13.6}$	P_s	29.43

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1/ From Continuous Monitor Data 8-13-81

MOHAWK, 8-19-81, 1/SASS

Temperature stack gas, average (°F)	T_s	384.3
Stack velocity (fps) $85.49\,(C_p)\,(\sqrt{\Delta P}_{s\ avg})\sqrt{\frac{T_s avg + 460}{P_s\quad M_s}}$ $85.49\,(\underline{.812})(\sqrt{.10})\sqrt{\frac{(\underline{384.3} + 460}{(\underline{29.43})\,(\underline{29.94})}}$	$V_{s(avg)}$	21.48
Total sample time (minutes)	θ	A 230 B 160 C 390
Nozzle diameter, actual (inches)	N_d	A .748 B .874
Percent isokinetic (%) $\frac{17.33\,(T_s + 460)(V_w\ std + V_m\ std)}{\theta\quad V_s\quad P_s\quad N_d^2}$ $\frac{17.33\,(\underline{384.3} + 460)((\underline{92.81}) + (\underline{453.91}))^{1/}}{(\underline{230})(\underline{21.48})(\underline{29.43})(\underline{.748})^2}$	%I	A 98.33 1/ B 97.77 2/ C 98.06 3/
Area of stack (ft^2) π = 3.1416 Diam = 45.5" $\pi r^2 \div 144$, $\pi(\underline{1.895})^2$ ~~÷ 144~~	A_s	11.281
Stack gas volume at standard conditions (dscfm) $60\,(1 - B_{wo})Vs_{avg}\,A_s\left(\frac{528}{T_s\ avg + 460}\right)\left(\frac{Ps}{29.92}\right)$ 60 (1 - .169) 21.48 $60\,(1 - \underline{.169})(\underline{21.48})(\underline{11.281})\left(\frac{528}{\underline{384.3} + 460}\right)\left(\frac{(29.43)}{(29.92)}\right)$	Q_s	7,431.9
Particulate matter concentration, dry (gr/dscf) $15.432\,\frac{M_p(grams)}{Vm_{std}}$, $15.432\,\frac{(\_\_\_\_)}{(\_\_\_\_)}$	$C_{s(std)}$	
Emission rate of particulate matter (lb/hr) $0.00857\,(Q_s)\,C_{s(std)}$, 0.00857 (______)(______)	E_p	

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$$2/\ \frac{17.33(384.3 + 460)((87.64 + 428.65)}{(160)\,(21.48)\,(29.43)\,(.874)^2}$$

3/ Volume weighted average % Isokinetic

SUPPLEMENTAL CALCULATIONS FOR 1/SASS
ISOKINETICS

$$V_{m\,std} = 17.64 \left(\frac{V_m}{\alpha}\right)\left(\frac{P_B + \Delta H}{T_m + 460}\right)$$

Ⓐ $$= 17.64 \left(\frac{527.768}{1.073}\right)\left(\frac{\left(29.44 + \frac{.771}{13.6}\right)}{103.8 + 460}\right)$$

$$= 453.931$$

Ⓑ $$= 17.64 \left(\frac{493.56}{1.073}\right)\left(\frac{\left(29.44 + \frac{1.379}{13.6}\right)}{99.2 + 460}\right)$$

$$= 428.65$$

Proportion Vlc by volume of sampled gas:

Ⓐ $\frac{453.931}{882.581} \times 3833.7 = 1971.75$ ml collected

Ⓑ $\frac{428.65}{882.581} \times 3833.7 = 1861.9$ ml collected

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Volume weighted average % isokinetic

$$\frac{(98.33 \times 453.931) + (97.77 \times 428.65)}{453.931 + 428.65} = 98.06\%$$

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FIELD DATA

Plant MOHAWK
Date 8-13-81
Sample Location R-2
Sample Type SASS
Run Number 2
Operator HOLM JJ
Ambient Temperature ~100°F
Barometric Pressure 29.42 @ 0716
Static Pressure, (H_2O) -0.07 in
Filter Number(s) MV-142-234

Leak Check: Initial at 21 " Hg, .045 CFM
Final at 20 " Hg, .041 CFM
Pitot Leak Check: 0.0

Impinger Volumes

Initial	Final	Net Gain
500	1750	1250
~~1000~~	1435	1430
	1005	

Silica Gel

900	24537	435.1
1128.6		

SASS Condensate 1440 @ pH=8.5
Total Volume 4545.1

Probe Length and Type 6' GLASS
Nozzel Size & I.D. 0.674 P-64
Pitot Coefficient & I.D. 0.812
Assumed Moisture 15%
Molecular Weight, Dry, (M_d) 28.13 Assumed
Meter Box Number 084
Meter Coefficient 3.406
α Factor 1.073
K =
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F							Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
												Gas Meter			
					Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	In	Out		
	0	1200	Init. 615.063												
	10	1210	648.860	0.10	1.635	1.654	384	400	89	65	400	97	91	8½	.316
	20	1220	682.780	0.10	1.635	1.666	387	398	82	66	400	100	93	8½	
	30	1230	716.000	0.10	1635	1.598	388	399	87	67	399	102	94	8½	
	40	1240	750.800	0.10	1.635	1.753	388	400	86	68	399	105	96	9	
	50	1250	784.440	0.10	1.635	1.638	388	404	86	69	399	105	97	9	
	[illegible]	1300	818.230	0.10	1.635	1.653	388	405	89	71	400	106	99	9	
	70	1310	852.050	0.10	1.635	1.656	388	397	89	70	399	108	100	9	
	80 *	1320	885.60	0.10	1.635	1.630	387	400	86	73	399	109	100	9	
	90	1331	920.	0.10	1.635	1.713	388	400	86	73	399	108	101	9½	

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Comments: 1320 (80 min) DRAINED CONDENSATE

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Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3 Init.	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O Desired	Orifice Pressure Differential (ΔH), in. H_2O Actual	Temperature °F Stack	Temperature °F Probe	Temperature °F Impinger	Temperature °F Organic Module	Temperature °F Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
	100	1341	952.34	0.10	1.635	1.51	388	395	99	73	400	109	101	9½	0.316
	110	[illegible]	985.54	0.10	1.635	1.60	388	401	92	70	400	111	102	10	
	120	1401	10[illegible].27	0.10	1.635	1.646	388	399	87	70	400	112	103	10	
	130*	1411	105[illegible].708	0.10	1.635	1.649	388	400	92	70	399	104	100	10	
	140	1428	10[illegible].35	0.10	1.635	1.639	388	400	86	70	399	110	102	10½	
	150	1438	11[illegible].2	0.10	1.635	1.659	388	402	88	71	398	112	98	10½	
	160	1448	11[illegible].43	0.10	1.635	1.597	387	403	85	67	399	113	104	10½	
	170	1458	1190.2	0.10	1.635		387	403	84	67	399	113	105	11	
	180	1508	1220.86	0.10	1.635	1.36	387	403	84	68	399	113	105	11½	
	190	1518	1255.000	0.10	1.635	1.688	387	401	86	68	399	112	106	11½	
	200*	1529	1289.052	0.10	1.635	1.679	388	400	88	68	399	116	106	11½	
	210	1540	1323.82	0.10	1.635	1.751	388	401	84	72	396	113	106	11½	
	220	1553	1370.3	0.10	1.635	1.85	398	400	89	73	399	112	103	11½	
	230	1600	1393.56	0.10	1.635	1.60	385	400	89	73	398	111	102	12	
	240	1610	1426.77	0.10	1.635	1.602	386	402	82	73	399	111	102	12	
	250	1620	1460.20	0.10	1.635	1.618	386	400	85	74	399	111	103	13	
	260	1630	1493.74	0.10	1.635	1.629	386	400	85	72	399	110	102	13	

Run No. SASS - 2

Date 8-13-81

Sampling Location B-2

Comments: *1411 (130 min.) NEW Silica GEL AND DRAINED CONDENSATE.

*1528 (200 min) : DRAINED CONDENSATE

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Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F							Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
			Init.		Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	Gas Meter In	Gas Meter Out		
	270	1640	1527.42	0.10	~~384~~ 1.635	1.643	384	403	90	70	400	109	102	13½	0.316
	*280	1650	1560.6	0.10	1.635	1.60	384	403	86	73	399	110	102	13½	
	290	1701	1594.18	0.10	1.635	1.633	385	400	86	73	399	110	102	13½	
	300	1711	1627.37		1.635	1.60	386	401	86	74	399	110	102	13½	
	310	1721	1660.765			END	OF		TEST						
			1045.702	.10		1.637	386.9	400.7	86.4	72.8	399	104.98			

Run No. SASS-2

Date 8-13-81

Sampling Location B-2

Comments: *1650 (280 min.): DRAINED CONDENSATE.

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant MOHAWK
Date 8-19-81
Sample Location B-2
Test No./Type 2/SASS

Performed by B.C. DuRos
J. Holm

Barometric Pressure (in. Hg)	P_b	29.42
Meter volume (std), $17.64 \left(\frac{V_m}{\alpha}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$ $17.64 \left(\frac{\overset{1045.702}{(\_\_\_)}}{(1.073)}\right)\left(\frac{(29.42) + \frac{(1.636)}{13.6}}{(105) + 460}\right)$	$V_{m\ std}$	901.341
Volume of liquid collected (grams)	Vl_c	4545.
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	$V_{w\ std}$	213.9
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std} + V_{m\ std}}, \frac{(214)}{(214) + (901)}$	B_{wo}	0.19
Molecular weight, stack gas dry (lb/lb-mole) $(\%\ CO_2 \times 0.44) + (\%\ O_2 \times 0.32) + (\%\ N_2 + \%\ CO \times 0.28)$ $(11.7 \times 0.44) + (2.5 \times 0.32) + 85.8 + \_\_\_ \times 0.28)$	M_d	[1] 29.97
Molecular weight, stack gas wet (lb/lb-moie) $Md(1-B_{wo}) + 18(B_{wo}), (29.97)(1-.19) + 18(.19)$	M_s	27.69
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (\text{in. } H_2O)}{13.6}, (29.42) + \frac{(-.07)}{13.6}$	P_s	29.41

[1] average from continuous monitor Data

MOHAWK 2/SASS 8-7-81

Temperature stack gas, average (^{o}F)	T_s	386.9
Stack velocity (fps) $85.49\ (C_p)\ (\sqrt{\Delta P}_{s\ avg})\ \sqrt{\dfrac{T_s avg + 460}{P_s\quad M_s}}$ $85.49\ (\underline{.812})(\sqrt{.10})\ \sqrt{\dfrac{(\underline{384}) + 460}{(\underline{29.41})(\underline{27.69})}}$	$V_{s(avg)}$	22.35
Total sample time (minutes)	θ	310
Nozzle diameter, actual (inches)	N_d	.812
Percent isokinetic (%) $\dfrac{17.33\ (T_s + 460)(V_w\ std + V_m\ std)}{\theta\quad V_s\quad P_s\quad {N_d}^2}$ $\dfrac{17.33\ (\underline{386.9} + 460)((\underline{213.9}) + (\overset{901.341}{\underline{\quad\quad}}))}{(\underline{310})(\underline{22.35})(\underline{29.41})(\underline{.812})^2}$	%I	121.8
Area of stack (ft^2) $\pi = 3.1416$ Diam = 45.5" $\pi r^2 \div 144$, - $\pi(\underline{\quad\quad})^2 \div 144$	A_s	11.281
Stack gas volume at standard conditions (dscfm) $60\ (1 - B_{wo})Vs_{avg}\ A_s \left(\dfrac{528}{T_s\ avg + 460}\right)\left(\dfrac{Ps}{29.92}\right)$ $60\ (1 - \underline{.19})(\underline{22.35})(\underline{11.281})\left(\dfrac{528}{\underline{386.9} + 460}\right)\left(\dfrac{(\underline{29.41})}{(29.92)}\right)$	Q_s	7,509.2
Particulate matter concentration, dry (gr/dscf) $15.432\ \dfrac{M_p(grams)}{Vm_{std}}$, $15.432\ \dfrac{(\underline{\quad\quad})}{(\underline{\quad\quad})}$	$C_{s(std)}$	
Emission rate of particulate matter (lb/hr) $0.00857\ (Q_s)\ C_{s(std)}$, $0.00857\ (\underline{\quad\quad})(\underline{\quad\quad})$	E_p	

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SAMPLE RATE CALCULATIONS

SASS /2 J. Holm

Assumptions

$M_d = 28.13$ (from M-5 data)
$B_{wo} = .15 \sim M_f = .85$
$\therefore M_s = 26.61$

$$V_s = 85.49 \times C_p \times \sqrt{\Delta P_{avg}} \times \sqrt{\frac{T_s + 460}{P_s \times M_s}}$$

$$= 85.49 \times .812 \times \sqrt{.10} \times \sqrt{\frac{384 + 460}{29.4 \times 26.61}}$$

$$= 22.784$$

$$Q_N = 0.327 \times V_s \times (D_N)^2$$

$$= .327 \times 22.784 \times (.874)^2$$

$$= 5.69 \text{ acfm}$$

$$R_M = Q_N \times \frac{P_s}{P_M} \times \frac{T_m + 460}{T_s + 460} \times M_f \times \alpha$$

$$= 5.69 \times \frac{29.4}{29.6} \times \frac{100 + 460}{400 + 460} \times .85 \times 1.073$$

$$= 3.360$$

$$\Delta H = 1.68 \left(\frac{R_m}{K_o}\right)^2 \quad 1.68 \times \left(\frac{3.360}{3.406}\right)^2$$

$$= 1.635$$

From Andersen Data Sheet

4.4 FIELD DATA SHEETS FOR CONTROLLED CONDENSATION

CONTROLLED CONDENSATION SYSTEM (CCS)
FIELD CHECKPOINT SHEET

Checkpoint	Initials		Remarks
	Supervisor	QA Inspector	
LABORATORY PREPARATION			
- Inspect and clean CCC. Both filter holder and CCC are cleaned with hot chromic acid solution and D.I. H_2O.	✓		
- Rinse with acetone and air dry CCC.	✓		
- Place Tissuequartz filter in filter housing.	✓		
- Check seal between end of joint and filter.	✓		
- Do not use grease on joints.	✓		
- Inspect and clean all glass joints.	✓		
SITE SETUP			
- Rinse the inside of probe prior to run.	✓		
- Rinse probe with acetone until rinse solution is clear.	✓		
- Perform leak test.	✓		.0015@15"Hg
- Leak rate must be less than 80 ml/min (0.003 cfm).	✓		
- Thermocouple leads attched to probe and filter.	✓		
- CCC water bath held at 60°C (140°F) ±1°C.	✓		
- Leak test train.	✓		
- Probe temperature maintained at 316°C (600°F) ±17°C.	✓		
- Gas temperature out of filter holder held at 228°C (550°F).	✓		
- Fresh solutions placed in impingers.	✓		
- Fresh absorbent replaced in final impinger.	✓		
- Adjust flowrate in system to 8 lpm.	✓		

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CONTROLLED CONDENSATION SYSTEM (CCS)
FIELD CHECKPOINT SHEET -- Continued

Checkpoint	Initials		Remarks
	Supervisor	QA Inspector	
SAMPLING RUN • Turn vacuum pump on just before inserting probe in stack.	✓		
• Check seal between probe and port to prevent any outside air from entering stack.	✓		
• Run test for 1 hour or until coils are frosted to 1/2 or 2/3 their length.	✓		
• After run, cap both ends of probe and lay in horizontal position.	✓		
• Rinse the CCC coils into the modified Erlenmeyer flask with a maximum of 40 ml D.I. H_2O.	✓		
• Was any of the solution lost (0 ml estimated)?	✓		
• After probe has cooled, it is rinsed with a maximum of 40 ml D.I. H_2O into a 25-ml Erlenmeyer flask. - Was any solution lost (0 ml estimated)?	✓		
- Clean support equipment priot to next run.	✓		
- Save filter for titration.	✓		

Comments:

CONTROLLED CONDENSATION SYSTEM (CCS)
FIELD DATA SHEET

Plant MOHAWK REFINERY
Date 8-11-81
Sample Location B-2
Run No. 1-CCS
Operator B.C. DAROS

Ambient Temperature 101°F
Barometric Pressure 29.54
Meter Box Number 069
Meter Orifice Coefficient .716
Meter α Factor 1.006

Clock Time (24-hr) clock / Sampling Time, min	Gas Meter Reading (V_m), ft^3	Temperature (°F)							
		Stack	Probe	Filter		Recirc Water	Exit Coil	Dry Gas Meter	
				Skin	Out			In	Out
0	Init. 278.300								
10	280.600	385	505	1105	401	120	121	101	98
20	283.120	385	541	1300	505	120	121	101	99
30	286.120	385	551	1401	532	120	123	102	100
40	289.320	385	550	1476	581	120	125	102	100
50	292.600	385	560	1572	580	120	128	102	100
60	295.100	385	563	1631	610	120	125	103	100
Average 60	16.8	385	545	1414	535	120	123.8	101.8	99.5

100.7

CONTROLLED CONDENSATION SYSTEM (CCS)
LABORATORY CHECKPOINTS

Checkpoint	Initials		Remarks
	Supervisor	QA Inspector	
LABORATORY ANALYSIS			
● Clean glassware prior to titration.			
● Use Bromphenol Blue indicator.			
● Is the NaOH buret protected with a CO_2 absorbent tube?			
● When was NaOH standardized last (Date)?			
● Filter any solution that has suspended particulate.			
● Use same number of indicator drops for each titration.			
● Perform indicator blank on a volume of D.I. H_2O equal to sample aliquot used.			
● Indicator blank added to H_2SO_4 milli-equivalents found.			
● Perform all analyses in triplicate.			
DATA ANALYSIS VERIFICATION			
● Obtain and titrate test samples from main laboratory.			

Comments:

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant Getty / Mohawk

Performed by M. Chips

Date 8-11-81

Sample Location B-2

Test No./Type B.C. DaRos #1 CCS

Barometric Pressure (in. Hg)	P_b	29.54
Meter volume (std), $17.64\left(\frac{V_m}{\alpha}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$ $17.64\left(\frac{(16.800)}{(1.006)}\right)\left(\frac{(29.54) + \frac{(0.2)}{13.6}}{(100.7) + 460}\right)$ ← From cal Sheet estimate M.C. 5-11-82	V_m std	15.527
Volume of liquid collected (grams)	Vl_c	—
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	V_w std	—
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std} + V_{m\ std}} = \frac{(\underline{\quad})}{(\underline{\quad}) + (\underline{\quad})}$	B_{wo}	From M5/17 test .158
Molecular weight, stack gas dry (lb/lb-mole) (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28) (___ x 0.44) + (___ x 0.32) + (___ + ___ x 0.28)	M_d	From M5/17 test 30.028
Molecular weight, stack gas wet (lb/lb-mole) $M_d(1-B_{wo}) + 18(B_{wo}) = (\underline{\quad})(1-\underline{\quad}) + 18(\underline{\quad})$	M_s	From M5/17 test 28.13
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (\text{in. } H_2O)}{13.6} = (\underline{\quad}) + \frac{(\underline{\quad})}{13.6}$	P_s	From M5/17 test 29.58

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Getty/Mohawk
8-11-81
CCS Test 1 Site B-2

Temperature stack gas, average (^{o}F)	T_s	385
Stack velocity (fps) $85.49\ (C_p)\ (\sqrt{\Delta P}_{s\ avg})\ \sqrt{\frac{T_s avg + 460}{P_s\ \ M_s}}$ $85.49\ (\underline{\quad})(\sqrt{\quad\quad})\ \sqrt{\frac{(\underline{\quad}) + 460}{(\underline{\quad})(\underline{\quad})}}$	$V_{s(avg)}$	From M5/17 test 19.746
Total sample time (minutes)	θ	60
Nozzle diameter, actual (inches)	N_d	—
Percent isokinetic (%) $\frac{17.33\ (T_s + 460)(V_w\ std + V_m\ std)}{\theta\quad V_s\quad P_s\quad N_d^2}$ $\frac{17.33\ (\underline{\quad} + 460)((\underline{\quad}) + (\underline{\quad}))}{(\underline{\quad\quad})(\underline{\quad\quad})(\underline{\quad\quad})(\underline{\quad}^2)}$	%I	
Area of stack (ft^2) $\pi = 3.1416$ $\pi r^2 \div 144,\quad \pi(\underline{\quad})^2 \div 144$	A_s	11.281
Stack gas volume at standard conditions (dscfm) $60\ (1 - B_{wo}) Vs_{avg}\ A_s \left(\frac{528}{T_s\ avg + 460}\right)\left(\frac{Ps}{29.92}\right)$ $60\ (1 - \underline{\quad})(\underline{\quad})(\underline{\quad})\left(\frac{528}{\underline{\quad\quad} + 460}\right)\left(\frac{(\underline{\quad})}{(29.92)}\right)$	Q_s	From M5/17 test 7,098.9
Particulate matter concentration, dry (gr/dscf) $15.432\ \frac{M_p(grams)}{Vm_{std}},\quad 15.432\ \frac{(\underline{\quad\quad})}{(\underline{\quad\quad})}$	$C_{s(std)}$	
Emission rate of particulate matter (lb/hr) $0.00857\ (Q_s)\ C_{s(std)},\ 0.00857\ (\underline{\quad\quad})(\underline{\quad\quad})$	E_p	

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CONTROLLED CONDENSATION SYSTEM (CCS)
FIELD DATA SHEET

Plant MOHAWK

Date 8-13-81

Sample Location B-2

Run No. 2-CCS

Operator DMROS

Ambient Temperature 100°F

Barometric Pressure 29.42 @ 0730

Meter Box Number 069

Meter Orifice Coefficient .716

Meter α Factor 1.006

Sampling Time, min / Clock Time (24-hr) clock	Gas Meter Reading (V_m), ft^3	Temperature (°F)							
		Stack	Probe	Filter		Recirc Water	Exit Coil	Dry Gas Meter	
				Skin	Out			In	Out
0 / 1340	Init. 296.100								
10 / 1350	301.000	385	580	1100	432	121	127	93	91
20 / 1400	305.400	385	581	1511	514	120	130	95	92
30	309.000	385	560	1572	556	120	131	93	91
40	311.900	385	560	1650	619	120	130	94	92
50	314.300	385	560	1651	618	120	130	94	92
60	317.300	385	560	1661	625	120	130	94	92
Average 60	21.2	385	566.8	1524	560.6	120.2	129.6	93.8	91.6

92.7

MOHAWK 2-CCS 8-15-81

CONTROLLED CONDENSATION SYSTEM (CCS)
FIELD CHECKPOINT SHEET

Checkpoint	Initials		Remarks
	Supervisor	QA Inspector	
LABORATORY PREPARATION			
• Inspect and clean CCC. Both filter holder and CCC are cleaned with hot chromic acid solution and D.I. H_2O.		✓	
• Rinse with acetone and air dry CCC.		✓	
• Place Tissuequartz filter in filter housing.		✓	
• Check seal between end of joint and filter.		✓	
• Do not use grease on joints.		✓	
• Inspect and clean all glass joints.		✓	
SITE SETUP			
• Rinse the inside of probe prior to run.		✓	
• Rinse probe with acetone until rinse solution is clear.		✓	
• Perform leak test.		✓	.001 @ 15" Hg
• Leak rate must be less than 80 ml/min (0.003 cfm).		✓	
• Thermocouple leads attched to probe and filter.		✓	
• CCC water bath held at 60°C (140°F) ±1°C.		✓	
• Leak test train.		✓	
• Probe temperature maintained at 316°C (600°F) ±17°C.		✓	
• Gas temperature out of filter holder held at 228°C (550°F).		✓	
• Fresh solutions placed in impingers.		✓	
• Fresh absorbent replaced in final impinger.		✓	
• Adjust flowrate in system to 8 lpm.		✓	

CONTROLLED CONDENSATION SYSTEM (CCS)
FIELD CHECKPOINT SHEET -- Continued

Checkpoint	Initials		Remarks
	Supervisor	QA Inspector	
SAMPLING RUN			
• Turn vacuum pump on just before inserting probe in stack.		✓	
• Check seal between probe and port to prevent any outside air from entering stack.		✓	
• Run test for 1 hour or until coils are frosted to 1/2 or 2/3 their length.		✓	
• After run, cap both ends of probe and lay in horizontal position.		✓	
• Rinse the CCC coils into the modified Erlenmeyer flask with a maximum of 40 ml D.I. H_2O.		✓	
• Was any of the solution lost (0 ml estimated)?		✓	
• After probe has cooled, it is rinsed with a maximum of 40 ml D.I. H_2O into a 25-ml Erlenmeyer flask. - Was any solution lost (0 ml estimated)?		✓	
- Clean support equipment priot to next run.		✓	
- Save filter for titration.		✓	

Comments:

CONTROLLED CONDENSATION SYSTEM (CCS)
LABORATORY CHECKPOINTS

Checkpoint	Initials		Remarks
	Supervisor	QA Inspector	
LABORATORY ANALYSIS • Clean glassware prior to titration.			
• Use Bromphenol Blue indicator.			
• Is the NaOH buret protected with a CO_2 absorbent tube?			
• When was NaOH standardized last (Date)?			
• Filter any solution that has suspended particulate.			
• Use same number of indicator drops for each titration.			
• Perform indicator blank on a volume of D.I. H_2O equal to sample aliquot used.			
• Indicator blank added to H_2SO_4 milli-equivalents found.			
• Perform all analyses in triplicate.			
DATA ANALYSIS VERIFICATION • Obtain and titrate test samples from main laboratory.			

Comments:

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant Getty / Mohawk Performed by M. Chips
Date 8-13-81
Sample Location B-2
Test No./Type 2 CCS B.C. DaRos

Barometric Pressure (in. Hg)	P_b	29.42
Meter volume (std), $17.64\left(\frac{V_m}{\alpha}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$ $17.64\left(\frac{(21.200)}{(1.006)}\right)\left(\frac{(29.42) + \frac{(0.2)}{13.6}}{(92.7) + 460}\right)$	$V_{m\ std}$	19.797
Volume of liquid collected (grams)	Vl_c	—
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	$V_{w\ std}$	—
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std} + V_{m\ std}} = \frac{(\_\_\_)}{(\_\_\_) + (\_\_\_)}$	B_{wo}	From M5/17 Test .1772
Molecular weight, stack gas dry (lb/lb-mole) $(\%\ CO_2 \times 0.44) + (\%\ O_2 \times 0.32) + (\%\ N_2 + \%\ CO \times 0.28)$ $(\_\_\_ \times 0.44) + (\_\_\_ \times 0.32) + (\_\_\_ + \_\_\_ \times 0.28)$	M_d	From M5/17 Test 30.028
Molecular weight, stack gas wet (lb/lb-mole) $Md(1-B_{wo}) + 18(B_{wo}) = (\_\_\_)(1-\_\_\_) + 18(\_\_\_)$	M_s	From M5/17 Test 27.896
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (in.\ H_2O)}{13.6} = (\_\_\_) + \frac{(\_\_\_)}{13.6}$	P_s	From M5/17 Test 29.41

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Getty/Mohawk
CCS test #2
8-13-81
Site B-2

Temperature stack gas, average (^oF)	T_s	385
Stack velocity (fps) $85.49\,(C_p)\,(\sqrt{\Delta P}_{s\ avg})\sqrt{\frac{T_s avg + 460}{P_s\ M_s}}$ $85.49\,(\_\_\_)(\sqrt{\quad})\sqrt{\frac{(\_\_\_)+460}{(\_\_\_)(\_\_\_)}}$	$V_{s(avg)}$	From M 5/17 Test 19.958
Total sample time (minutes)	θ	60
Nozzle diameter, actual (inches)	N_d	—
Percent isokinetic (%) $\frac{17.33\,(T_s + 460)(V_w\ std + V_m\ std)}{\theta\quad V_s\quad P_s\quad N_d^2}$ $\frac{17.33\,(\_\_\_ + 460)((\_\_\_) + (\_\_\_))}{(\_\_\_)(\_\_\_)(\_\_\_)(\_\_\_^2)}$	%I	
Area of stack (ft^2) $\pi = 3.1416$ $\pi r^2 \div 144$, $\pi(\_\_\_)^2 \div 144$	A_s	11,281
Stack gas volume at standard conditions (dscfm) $60\,(1 - B_{wo})Vs_{avg}\,A_s\left(\frac{528}{T_s\ avg + 460}\right)\left(\frac{Ps}{29.92}\right)$ $60\,(1 - \_\_\_)(\_\_\_)(\_\_\_)\left(\frac{528}{\_\_\_ + 460}\right)\left(\frac{(\_\_\_)}{(29.92)}\right)$	Q_s	From M 5/17 Test 6,918.5
Particulate matter concentration, dry (gr/dscf) $15.432\,\frac{M_p(grams)}{Vm_{std}}$, $15.432\,\frac{(\_\_\_)}{(\_\_\_)}$	$C_{s(std)}$	
Emission rate of particulate matter (lb/hr) $0.00857\,(Q_s)\,C_{s(std)}$, $0.00857\,(\_\_\_)(\_\_\_)$	E_p	

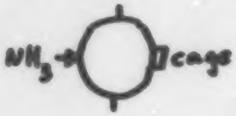
7602/5/81/Rev 1

4.5 FIELD DATA SHEETS FOR AMMONIA

FIELD DATA

Page 1 of 1

Plant MOHAWK
Date 8-11-81
Sample Location B-2
Sample Type NH3
Run Number 1
Operator J. STIENER
Ambient Temperature hot
Barometric Pressure 29.59 @ 0945
Static Pressure, (H_2O) − 0.07
Filter Number(s) MV-142-165



Impinger Volumes

Initial	Final	Net Gain
	N/A	
Silica Gel		
SASS Condensate		
Total Volume		

Probe Length and Type 3' glass
Nozzel Size & I.D. /P29
Pitot Coefficient & I.D. .785/
Assumed Moisture .15 Bwo
Molecular Weight, Dry, (M_d)
Meter Box Number 084
Meter Coefficient .693
α Factor 1.011
K =
$K(Md)^4$ = ___ x (___)^4 = ___
$\Delta H = K(M_d)^4 \left(\frac{Tm}{TS}\right)$ (P)

Leak Check: Initial at 15 " Hg, .006 CFM
Final at 15 " Hg, .008 CFM
Pitot Leak Check: ok begin

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F							Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
					Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	Gas Meter In	Gas Meter Out		
	0	11:05	Init. 541.777												
4	5		544.475	0.12		1.0	372	469	—		474	95	95	<1	
	10		547.680	0.12		1.0	370	463			449	95	95	<1	
	15		549.810	0.11		1.0	371	449			449	94	95	<1	
	20		552.490	0.10		1.0	371	448			454	94	95	<1	
	25		555.150	0.10		1.0	371	453			449	95	96	<1	
	30	11:35	557.858												
	30		16.081	0.11		1.0	371	456.4			455	94.9			

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Comments:
1. seal port with duct tape
2. no impinger TC available in shower head; lots of ice in bath; shower head cool to touch
3. very slight -ve pressure (static)
4. leak check from front of filter holder back

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant Mohawk

Date 8-11-81

Sample Location B-2

Test No./Type 1/NH_3

Performed by DuRos

Barometric Pressure (in. Hg)	P_b	29.57
Meter volume (std), $17.64\left(\frac{V_m}{\alpha}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$ $17.64\left(\frac{(16.08)}{(1.011)}\right)\left(\frac{(29.57) + \frac{(1.0)}{13.6}}{(94.9) + 460}\right)$	$V_{m\ std}$	14.998
Volume of liquid collected (grams)	Vl_c	
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	$V_{w\ std}$	
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std} + V_{m\ std}}$, $\frac{(\_\_\_)}{(\_\_\_) + (\_\_\_)}$	B_{wo}	.158 Run No 1 From M-5/17
Molecular weight, stack gas dry (lb/lb-mole) (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28) (___ x 0.44) + (___ x 0.32) + (___ + ___ x 0.28)	M_d	
Molecular weight, stack gas wet (lb/lb-mole) $Md(1-B_{wo}) + 18(B_{wo})$, (___)(1-___) + 18(___)	M_s	
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (\text{in. } H_2O)}{13.6}$, $(\_\_\_) + \frac{(\_\_\_)}{13.6}$	P_s	

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Temperature stack gas, average (^{o}F)	T_s	
Stack velocity (fps) $85.49\,(C_p)\,(\sqrt{\Delta P}_{s\ avg})\,\sqrt{\dfrac{T_s avg + 460}{P_s \quad M_s}}$ $85.49\,(\underline{\quad})(\sqrt{\quad})\,\sqrt{\dfrac{(\underline{\quad}) + 460}{(\underline{\quad})(\underline{\quad})}}$	$V_{s(avg)}$	
Total sample time (minutes)	θ	
Nozzle diameter, actual (inches)	N_d	
Percent isokinetic (%) $\dfrac{17.33\,(T_s + 460)(V_w\ std + V_m\ std)}{\theta \quad V_s \quad P_s \quad N_d^2}$ $\dfrac{17.33\,(\underline{\quad} + 460)((\underline{\quad}) + (\underline{\quad}))}{(\underline{\quad})(\underline{\quad})(\underline{\quad})(\underline{\quad}^{2})}$	%I	
Area of stack (ft^2) $\pi = 3.1416$ $\pi r^2 \div 144$, $\pi(\underline{\quad})^2 \div 144$	A_s	
Stack gas volume at standard conditions (dscfm) $60\,(1 - B_{wo})Vs_{avg}\,A_s \left(\dfrac{528}{T_s\ avg + 460}\right) \left(\dfrac{Ps}{29.92}\right)$ $60\,(1 - \underline{\quad})(\underline{\quad})(\underline{\quad})\left(\dfrac{528}{\underline{\quad} + 460}\right) \left(\dfrac{(\underline{\quad})}{(29.92)}\right)$	Q_s	
Particulate matter concentration, dry (gr/dscf) $15.432\,\dfrac{M_p(\text{grams})}{Vm_{std}}$, $15.432\,\dfrac{(\underline{\quad})}{(\underline{\quad})}$	$C_{s(std)}$	
Emission rate of particulate matter (lb/hr) $0.00857\,(Q_s)\,C_{s(std)}$, $0.00857\,(\underline{\quad})(\underline{\quad})$	E_p	

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FIELD DATA

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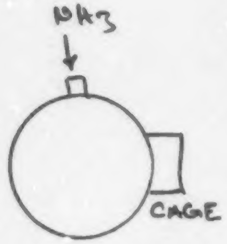
Plant MOHAWK
Date 8-11-81
Sample Location B-2
Sample Type NH3
Run Number 2
Operator J. STIENER
Ambient Temperature
Barometric Pressure 29.59
Static Pressure, (H_2O)
Filter Number(s)



Impinger Volumes

Initial	Final	Net Gain
N/A		
Silica Gel		

SASS Condensate

Total Volume

Probe Length and Type 3' GLASS
Nozzel Size & I.D. P-94
Pitot Coefficient & I.D. .765 (POS)
Assumed Moisture 15.870
Molecular Weight, Dry, (M_d)
Meter Box Number D69
Meter Coefficient .693
α Factor 1.011
K =
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

Leak Check: Initial at ___ " Hg, ___ CFM
Final at ___ " Hg, ___ CFM
Pitot Leak Check: OK

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F							Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
					Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	Gas Meter In	Gas Meter Out		
	0	1:27	Init. 558.152												
4	5		560.850	0.10		1.0	365	450			453	102	100	<1	
	10		563.585	0.10		1.0	364	453			445	102	100	<1	
	15		566.265	0.10		1.0	363	459			450	103	101	<1	
	20		568.955	0.10		1.0	363	460			452	103	101	<1	
	25		571.600	0.10		1.0	363	460			451	104	102	<1	
4	30		574.306												
	30		16.154	0.10		1.0	363.8	456.4			450.2	101.8			

7602/5/81/Rev 1

Comments:

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant MOHAWK

Performed by Dna Ros

Date 8-11-81

Sample Location B-2

Test No./Type 2/NH_3

Barometric Pressure (in. Hg)	P_b	29.59
Meter volume (std), $17.64 \left(\frac{V_m}{\alpha}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$ $17.64 \left(\frac{(16.159)}{(1.011)}\right)\left(\frac{(2959) + \frac{(1.0)}{13.6}}{(101.8) + 460}\right)$	$V_{m\ std}$	14.88
Volume of liquid collected (grams)	Vl_c	
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	$V_{w\ std}$	
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std} + V_{m\ std}}, \frac{(\_\_\_)}{(\_\_\_) + (\_\_\_)}$	B_{wo}	.158 From 1-M5/17
Molecular weight, stack gas dry (lb/lb-mole) (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28) (___ x 0.44) + (___ x 0.32) + (___ + ___ x 0.28)	M_d	
Molecular weight, stack gas wet (lb/lb-mole) $Md(1-B_{wo}) + 18(B_{wo})$, (___)(1-___) + 18(___)	M_s	
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (\text{in. } H_2O)}{13.6}, (\_\_\_) + \frac{(\_\_\_)}{13.6}$	P_s	

7602/5/81/Rev 1

Temperature stack gas, average (^{o}F)	T_s	
Stack velocity (fps) $85.49\ (C_p)\ (\sqrt{\Delta P}_{s\ avg})\ \sqrt{\frac{T_s avg + 460}{P_s\ \ M_s}}$ $85.49\ (\_\_\_)(\sqrt{})\ \sqrt{\frac{(\_\_\_) + 460}{(\_\_\_)(\_\_\_)}}$	$V_{s(avg)}$	
Total sample time (minutes)	θ	
Nozzle diameter, actual (inches)	N_d	
Percent isokinetic (%) $\frac{17.33\ (T_s + 460)(V_w\ std + V_m\ std)}{\theta\ \ V_s\ \ P_s\ \ N_d^2}$ $\frac{17.33\ (\_\_\_ + 460)((\_\_\_) + (\_\_\_))}{(\_\_\_)(\_\_\_)(\_\_\_)(^2\_\_\_)}$	%I	
Area of stack (ft^2) $\pi = 3.1416$ $\pi r^2 \div 144$, $\pi(\_\_\_)^2 \div 144$	A_s	
Stack gas volume at standard conditions (dscfm) $60\ (1 - B_{wo}) Vs_{avg}\ A_s \left(\frac{528}{T_s\ avg + 460}\right) \left(\frac{Ps}{29.92}\right)$ $60\ (1 - \_\_)(\_\_)(\_\_)\left(\frac{528}{\_\_\_ + 460}\right) \left(\frac{(\_\_)}{(29.92)}\right)$	Q_s	
Particulate matter concentration, dry (gr/dscf) $15.432\ \frac{M_p(grams)}{Vm_{std}}$, $15.432\ \frac{(\_\_\_)}{(\_\_\_)}$	$C_{s(std)}$	
Emission rate of particulate matter (lb/hr) $0.00857\ (Q_s)\ C_{s(std)}$, $0.00857\ (\_\_\_)(\_\_\_)$	E_p	

FIELD DATA

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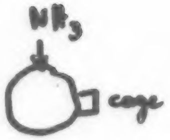
Plant Mohawk
Date 8/11
Sample Location B-2
Sample Type NH_3
Run Number 3
Operator JS
Ambient Temperature very hot
Barometric Pressure 29.54 @ 1500
Static Pressure, (H_2O) -.07
Filter Number(s)



Impinger Volumes

Initial	Final	Net Gain
	N/A	
	Silica Gel	

SASS Condensate

Total Volume

Probe Length and Type 3' glass
Nozzel Size & I.D. 1/P94
Pitot Coefficient & I.D. .785/P05
Assumed Moisture
Molecular Weight, Dry, (M_d)
Meter Box Number 069
Meter Coefficient .693
α Factor 1.011
K =
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

Leak Check: Initial at 15 " Hg, .007 CFM
Final at 15 " Hg, .005 CFM
Pitot Leak Check: OK begin

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O Desired	Actual	Temperature °F Stack	Probe	Impinger	Organic Module	Oven	Gas Meter In	Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
	0	4:00	Init. 258.702												
4	5		261.615	0.11		1.0	366	444			446	104	107	<1	
	10		264.460	0.11		1.0	366	446			444	104	107	<1	
	15		267.335	0.11		1.0	366	441			468	104	107	<1	
	20		270.775	0.11		1.0	366	442			492	105	107	<1	
	25		273.075	0.105		1.0	364	451			464	104	107	<1	
	30	4:30	275.959												
	30		17.257	0.109		1.0	365.6	444.8			462.8	105.6			

7602/5/81/Rev 1

Comments:

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant MOHAWK

Performed by DaRos

Date 8-11-81

Sample Location B-2

Test No./Type 3/NH_3

Barometric Pressure (in. Hg)	P_b	29.54
Meter volume (std), $17.64\left(\frac{V_m}{\alpha}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$ $17.64\left(\frac{(17.257)}{(1.011)}\right)\left(\frac{(29.54) + \frac{(1.0)}{13.6}}{(105.6) + 460}\right)$	$V_{m\ std}$	15.765
Volume of liquid collected (grams)	Vl_c	
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	$V_{w\ std}$	
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std} + V_{m\ std}}$, $\frac{(\_\_\_)}{(\_\_\_) + (\_\_\_)}$	B_{wo}	
Molecular weight, stack gas dry (lb/lb-mole) $(\%\ CO_2 \times 0.44) + (\%\ O_2 \times 0.32) + (\%\ N_2 + \%\ CO \times 0.28)$ $(\_\_\_ \times 0.44) + (\_\_\_ \times 0.32) + (\_\_\_ + \_\_\_ \times 0.28)$	M_d	
Molecular weight, stack gas wet (lb/lb-mole) $Md(1-B_{wo}) + 18(B_{wo})$, $(\_\_\_)(1-\_\_\_) + 18(\_\_\_)$	M_s	
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (\text{in. } H_2O)}{13.6}$, $(\_\_\_) + \frac{(\_\_\_)}{13.6}$	P_s	

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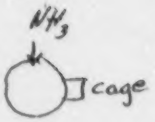
Temperature stack gas, average (^{0}F)	T_s	
Stack velocity (fps) $85.49\,(C_p)\,(\sqrt{\Delta P}_{s\ avg})\,\sqrt{\frac{T_s\text{avg} + 460}{P_s \quad M_s}}$ $85.49\,(\_\_\_)(\sqrt{\quad\quad})\,\sqrt{\frac{(\_\_\_) + 460}{(\_\_\_)(\_\_\_)}}$	$V_{s(avg)}$	
Total sample time (minutes)	θ	
Nozzle diameter, actual (inches)	N_d	
Percent isokinetic (%) $\frac{17.33\,(T_s + 460)(V_w\text{ std} + V_m\text{ std})}{\theta \quad V_s \quad P_s \quad N_d^2}$ $\frac{17.33\,(\_\_\_ + 460)((\_\_\_) + (\_\_\_))}{(\_\_\_)(\_\_\_)(\_\_\_)(^2\_\_\_)}$	%I	
Area of stack (ft^2) $\pi = 3.1416$ $\pi r^2 \div 144$, $\pi(\_\_\_)^2 \div 144$	A_s	
Stack gas volume at standard conditions (dscfm) $60\,(1 - B_{wo})Vs_{avg}\,A_s\left(\frac{528}{T_s\text{ avg} + 460}\right)\left(\frac{Ps}{29.92}\right)$ $60\,(1 - \_\_\_)(\_\_\_)(\_\_\_)\left(\frac{528}{\_\_\_ + 460}\right)\left(\frac{(\_\_\_)}{(29.92)}\right)$	Q_s	
Particulate matter concentration, dry (gr/dscf) $15.432\,\frac{M_p(\text{grams})}{Vm_{std}}$, $15.432\,\frac{(\_\_\_)}{(\_\_\_)}$	$C_{s(std)}$	
Emission rate of particulate matter (lb/hr) $0.00857\,(Q_s)\,C_{s(std)}$, $0.00857\,(\_\_\_)(\_\_\_)$	E_p	

7602/5/81/Rev 1

FIELD DATA

Page 1 of 1

Plant Mohawk
Date 8/13
Sample Location stack
Sample Type NH3
Run Number 4
Operator JS
Ambient Temperature
Barometric Pressure 29.35@1515
Static Pressure, (H_2O) -.07
Filter Number(s)



Impinger Volumes

Initial	Final
N/A	

Silica Gel

Probe Length and Type 3' glass
Nozzel I.D. (No.) P94
Assumed Moisture
Molecular Weight, Dry, (M_d)
Meter Box Number 069
Meter Coefficient .693
α Factor 1.011
K =
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(M_d)^4 \left(\frac{Tm}{Ts}\right) (\Delta P)$

Leak Check: Initial at 12 " Hg, 0.008 CFM pitot ok
Final at 12 " Hg, 0.006 CFM pitot ok

stop 4:44
restart 5:45

Traverse Point Number	Sampling Time, min / Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F							Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
				Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	Gas Meter In	Gas Meter Out		
	0 / 4:39	Init. 317.368												
4	5	320.215	0.125		1.0	376	457			427	95	94	3	
	10	323.105	0.120		1.0	376	445			451	95	94	2	
	15	325.950	0.120		1.0	377	453			443	95	94	2.5	
	20	328.820	0.125		1.0	377	442			437	95	94	2.5	
	25	331.680	0.120		1.0	377	453			469	95	94	2.5	
	30	334.552	0.120		1.0	377	458			460	95	94		
	20	17.184	0.122		1.0	376.6	451.3			447.8	94.5			

Comments: stopped test because lack of power

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant Mohawk

Performed by DuRos

Date 8-13-81

Sample Location B-2

Test No./Type 4/NH_4

Barometric Pressure (in. Hg)	P_b	29.35
Meter volume (std), $17.64 \left(\frac{V_m}{\alpha}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$ $17.64 \left(\frac{(17.84)}{(1.011)}\right)\left(\frac{(29.35) + \frac{(.122)}{13.6}}{(94.5) + 460}\right)$	$V_{m\ std}$	15.875
Volume of liquid collected (grams)	Vl_c	
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	$V_{w\ std}$	
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std} + V_{m\ std}}, \frac{(\underline{\quad})}{(\underline{\quad}) + (\underline{\quad})}$	B_{wo}	
Molecular weight, stack gas dry (lb/lb-mole) $(\%\ CO_2 \times 0.44) + (\%\ O_2 \times 0.32) + (\%\ N_2 + \%\ CO \times 0.28)$ $(\underline{\quad} \times 0.44) + (\underline{\quad} \times 0.32) + (\underline{\quad} + \underline{\quad} \times 0.28)$	M_d	
Molecular weight, stack gas wet (lb/lb-mole) $Md(1-B_{wo}) + 18(B_{wo}), (\underline{\quad})(1-\underline{\quad}) + 18(\underline{\quad})$	M_s	
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (\text{in. } H_2O)}{13.6}, (\underline{\quad}) + \frac{(\underline{\quad})}{13.6}$	P_s	

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Temperature stack gas, average (^{o}F)	T_s	
Stack velocity (fps) $85.49\ (C_p)\ (\sqrt{\Delta P}_{s\ avg})\ \sqrt{\frac{T_s avg + 460}{P_s \quad M_s}}$ $85.49\ (\_\_\_)(\sqrt{\quad\quad})\ \sqrt{\frac{(\_\_\_) + 460}{(\_\_\_)(\_\_\_)}}$	$V_{s(avg)}$	
Total sample time (minutes)	θ	
Nozzle diameter, actual (inches)	N_d	
Percent isokinetic (%) $\frac{17.33\ (T_s + 460)(V_w\ std + V_m\ std)}{\theta \quad V_s \quad P_s \quad N_d^2}$ $\frac{17.33\ (\_\_\_ + 460)((\_\_\_) + (\_\_\_))}{(\_\_\_)(\_\_\_)(\_\_\_)(\_\_\_^2)}$	%I	
Area of stack (ft^2) $\pi = 3.1416$ $\pi r^2 \div 144$, $\quad \pi(\_\_\_)^2 \div 144$	A_s	
Stack gas volume at standard conditions (dscfm) $60\ (1 - B_{wo})Vs_{avg}\ A_s \left(\frac{528}{T_s\ avg + 460}\right) \left(\frac{Ps}{29.92}\right)$ $60\ (1 - \_\_\_)(\_\_\_)(\_\_\_)\left(\frac{528}{\_\_\_ + 460}\right) \left(\frac{(\_\_\_)}{(29.92)}\right)$	Q_s	
Particulate matter concentration, dry (gr/dscf) $15.432\ \frac{M_p(grams)}{Vm_{std}}$, $\quad 15.432\ \frac{(\_\_\_)}{(\_\_\_)}$	$C_{s(std)}$	
Emission rate of particulate matter (lb/hr) $0.00857\ (Q_s)\ C_{s(std)}$, $0.00857\ (\_\_\_)(\_\_\_)$	E_p	

7602/5/81/Rev 1

FIELD DATA

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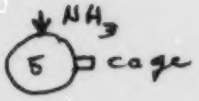
Plant MOHAWK
Date 8-13-81
Sample Location B-2
Sample Type NH4
Run Number 5
Operator STIENER
Ambient Temperature ~90°F
Barometric Pressure 29.35
Static Pressure, (H_2O) -.07
Filter Number(s)



Impinger Volumes

Initial	Final
N/A	

Silica Gel

Probe Length and Type 3' GLASS
Nozzel I.D. (No.) P-94
Assumed Moisture
Molecular Weight, Dry, (M_d)
Meter Box Number 069
Meter Coefficient .693
α Factor 1.0011
K =
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right) (\Delta P)$
ap = .785 (POS)

Leak Check: Initial at 12" Hg, .011 CFM Pitot ok
Final at 12" Hg, .003 CFM Pitot ok

Traverse Point Number	Sampling Time, min / Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F							Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
				Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	Gas Meter			
											In	Out		
	0 / 7:47	Init. 334.828												
4	5	337.700	0.115		1.0	378	455			467	93	92	2	
	10	340.575	0.115		1.0	378	455			451	92	92	2	
	15	343.430	0.115		1.0	377	440			432	92	92	2.5	
	20	346.275	0.12		1.0	378	452			482	92	91	2.5	
	25	349.155	0.11		1.0	378	468			462	91	91	2.5	
	30.1	352.065												
	30.1	17.207	0.115		1.0	377.8	454			558.8	91.8			

Comments:

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant Mohawk   Performed by DiaRos

Date 8-13-81

Sample Location B-2

Test No./Type 5/NH4

Barometric Pressure (in. Hg)	P_b	29.35
Meter volume (std), $17.64\left(\frac{V_m}{\alpha}\right)\left(\frac{P_b+\frac{\Delta H}{13.6}}{T_m+460}\right)$ $17.64\left(\frac{(17.20)}{(1.011)}\right)\left(\frac{(29.35)+\frac{(.115)}{13.6}}{(91.8)+460}\right)$	$V_{m\ std}$	15.974
Volume of liquid collected (grams)	Vl_c	
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	$V_{w\ std}$	
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std}+V_{m\ std}},\ \frac{(\underline{\quad})}{(\underline{\quad})+(\underline{\quad})}$	B_{wo}	
Molecular weight, stack gas dry (lb/lb-mole) $(\%\ CO_2 \times 0.44) + (\%\ O_2 \times 0.32) + (\%\ N_2 + \%\ CO \times 0.28)$ $(\underline{\quad} \times 0.44) + (\underline{\quad} \times 0.32) + (\underline{\quad} + \underline{\quad} \times 0.28)$	M_d	
Molecular weight, stack gas wet (lb/lb-mole) $Md(1-B_{wo}) + 18(B_{wo}),\ (\underline{\quad})(1-\underline{\quad}) + 18(\underline{\quad})$	M_s	
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (\text{in. } H_2O)}{13.6},\ (\underline{\quad}) + \frac{(\underline{\quad})}{13.6}$	P_s	

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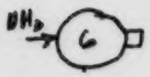
Temperature stack gas, average (^{o}F)	T_s	
Stack velocity (fps) $85.49\ (C_p)\ (\sqrt{\Delta}P_{s\ avg})\ \sqrt{\frac{T_s avg + 460}{P_s\quad M_s}}$ $85.49\ (\_\_\_)(\sqrt{\quad\quad})\ \sqrt{\frac{(\_\_\_) + 460}{(\_\_\_)(\_\_\_)}}$	$V_{s(avg)}$	
Total sample time (minutes)	θ	
Nozzle diameter, actual (inches)	N_d	
Percent isokinetic (%) $\frac{17.33\ (T_s + 460)(V_w\ std + V_m\ std)}{\theta\quad V_s\quad P_s\quad N_d^2}$ $\frac{17.33\ (\_\_\_ + 460)((\_\_\_) + (\_\_\_))}{(\_\_\_)(\_\_\_)(\_\_\_)(\overset{2}{\_\_\_})}$	%I	
Area of stack (ft^2) $\pi = 3.1416$ $\pi r^2 \div 144$, $\pi(\_\_\_)^2 \div 144$	A_s	
Stack gas volume at standard conditions (dscfm) $60\ (1 - B_{wo})Vs_{avg}\ A_s \left(\frac{528}{T_s\ avg + 460}\right)\left(\frac{Ps}{29.92}\right)$ $60\ (1 - \_\_\_)(\_\_\_)(\_\_\_)\left(\frac{528}{\_\_\_ + 460}\right)\left(\frac{(\_\_\_)}{(29.92)}\right)$	Q_s	
Particulate matter concentration, dry (gr/dscf) $15.432\ \frac{M_p(grams)}{Vm_{std}}$, $15.432\ \frac{(\_\_\_)}{(\_\_\_)}$	$C_{s(std)}$	
Emission rate of particulate matter (lb/hr) $0.00857\ (Q_s)\ C_{s(std)}$, $0.00857\ (\_\_\_)(\_\_\_)$	E_p	

FIELD DATA

Page 1 of 1

Plant MOHAWK
Date 8-13-81
Sample Location R-2
Sample Type NH₃
Run Number 6
Operator J.S.
Ambient Temperature ~90°F
Barometric Pressure 29.35
Static Pressure, (H_2O) -.07
Filter Number(s)



Impinger Volumes

Initial	Final
N/A	

Silica Gel

Probe Length and Type 3' GLASS
Nozzel I.D. (No.) P-94
Assumed Moisture
Molecular Weight, Dry, (M_d)
Meter Box Number 069
Meter Coefficient .693
α Factor 1.0011
K =
$K(Nd)^4 = \_\_ \times (\_\_)^4 = \_\_$
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right) (\Delta P)$

Leak Check: Initial at 12 " Hg. .004 CFM pitot ok
Final at 12 " Hg. .005 CFM pitot ok

Traverse Point Number	Sampling Time, min / Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F							Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
				Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	Gas Meter In	Gas Meter Out		
	0 / 9:25	Init. 358.448												
	5	361.345	0.115		1.0	378	453			360	83	82	2.0	
Run #6	10	364.195	0.115		1.0	378	450			423	83	82	2.0	
0.1 H_2SO_4	15	367.045	0.115		1.0	378	450			465	82	82	2.0	
	20	369.885	0.115		1.0	378	453			460	82	81	2.0	
	25	372.730	0.115		1.0	378	454			459	82	81	2.0	
	30	375.584												
	30	17.136	0.115		1.0	378	452			433.4	82	0	2.0	

Comments:

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ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant MOHAWK

Performed by DiaRes

Date 8-13-81

Sample Location B-2

Test No./Type 6/NH4

Barometric Pressure (in. Hg)	P_b	29.35
Meter volume (std), $17.64 \left(\frac{V_m}{\alpha}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$ $17.64 \left(\frac{(17.136)}{(1.011)}\right)\left(\frac{(29.35) + \frac{(0.115)}{13.6}}{(82.0) + 460}\right)$	$V_{m\ std}$	16.195
Volume of liquid collected (grams)	Vl_c	
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	$V_{w\ std}$	
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std} + V_{m\ std}}, \frac{(\underline{\quad})}{(\underline{\quad}) + (\underline{\quad})}$	B_{wo}	
Molecular weight, stack gas dry (lb/lb-mole) (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28) (___ x 0.44) + (___ x 0.32) + (___ + ___ x 0.28)	M_d	
Molecular weight, stack gas wet (lb/lb-mole) $Md(1-B_{wo}) + 18(B_{wo})$, (___)(1-___) + 18(___)	M_s	
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (\text{in. } H_2O)}{13.6}, (\underline{\quad}) + \frac{(\underline{\quad})}{13.6}$	P_s	

7602/5/81/Rev 1

Temperature stack gas, average (^{o}F)	T_s	
Stack velocity (fps) $85.49\ (C_p)\ (\sqrt{\Delta P}_{s\ avg})\ \sqrt{\frac{T_s avg + 460}{P_s \quad M_s}}$ $85.49\ (\_\_\_)(\sqrt{\qquad})\ \sqrt{\frac{(\_\_\_) + 460}{(\_\_\_)(\_\_\_)}}$	$V_{s(avg)}$	
Total sample time (minutes)	θ	
Nozzle diameter, actual (inches)	N_d	
Percent isokinetic (%) $\frac{17.33\ (T_s + 460)(V_w\ std + V_m\ std)}{\theta \quad V_s \quad P_s \quad N_d^2}$ $\frac{17.33\ (\_\_\_ + 460)((\_\_\_) + (\_\_\_))}{(\_\_\_\_)(\_\_\_\_)(\_\_\_\_)(\_\_\_\_^{2})}$	%I	
Area of stack (ft^2) $\pi = 3.1416$ $\pi r^2 \div 144$, $\quad \pi(\_\_\_)^2 \div 144$	A_s	
Stack gas volume at standard conditions (dscfm) $60\ (1 - B_{wo})Vs_{avg}\ A_s \left(\frac{528}{T_s\ avg + 460}\right)\left(\frac{Ps}{29.92}\right)$ $60\ (1 - \_\_\_)(\_\_\_)(\_\_\_)\left(\frac{528}{\_\_\_\_ + 460}\right)\left(\frac{(\_\_\_)}{(29.92)}\right)$	Q_s	
Particulate matter concentration, dry (gr/dscf) $15.432\ \frac{M_p(grams)}{Vm_{std}}$, $\quad 15.432\ \frac{(\_\_\_\_)}{(\_\_\_\_)}$	$C_{s(std)}$	
Emission rate of particulate matter (lb/hr) $0.00857\ (Q_s)\ C_{s(std)}$, $0.00857\ (\_\_\_\_)(\_\_\_\_)$	E_p	

SECTION 5

ANALYTICAL LABORATORY RESULTS

5.1 FUEL ULTIMATE ANALYSES

5.2 PARTICULATE EMISSIONS FROM METHOD 5 AND 17

5.3 PARTICULATE EMISSIONS FROM SASS SAMPLES

5.4 SULFUR OXIDE EMISSIONS FROM CONTROLLED CONDENSATION SAMPLES

5.5 TRACE ELEMENT ANALYSES

5.6 AMMONIA ANALYSES

5.7 TOTAL CHROMATOGRAPHABLE (TCO), GRAVIMETRIC ORGANICS, INFRARED SPECTRA (IR), AND GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS) OF TOTAL SAMPLE EXTRACTS

5.8 LIQUID CHROMATOGRAPHY (LC) SEPARATION AND INFRARED SPECTRA OF LC FRACTIONS

5.9 C_1-C_6 HYDROCARBON ANALYSES

5.10 RADIOMETRIC ANALYSES RESULTS

5.11 BIOLOGICAL ASSAY RESULTS

5.1 FUEL ULTIMATE ANALYSES

Subcontract PO 591862
Release #3

ORIGINAL

RECEIVED NOV 17 1981

Prelim. No. 7520
Lab. No. 81ml35

November 16,1981
Page 2 of 2

Methanol 1

Methanol 2

	#3, Code 813822			#4, Code 813864		
	1st Test	2nd Test	3rd Test	1st Test	2nd Test	3rd Test
Carbon (C),% --------	86.53	--	--	86.01	--	--
Hydrogen (H),% ------	11.50	--	--	12.18	--	--
Oxygen (O), by difference,% ----	0.71	--	--	0.65	--	--
Nitrogen (N),% ------	.58	.68	.68	.51	.69	.68
Sulfur (S),% --------	.47	.49	.47	.47	.47	.47
Heating Value: BUT per Pound ------	18,900	--	--	19,170	--	--
Gravity, API° @ 70°F	18.0	--	--	18.1		
@ 60°F	17.4	--	--	17.5	--	--

Curtis & Tompkins Ltd.

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Getty Refining and Marketing Co.

[illegible] [illegible]	Unit: REF[illegible]				B /12	
SAMPLE SOURCE	15-V-15					
SAMPLE TIME	300 PM					
PERCENT	Mole					
HYDROGEN	53.091					
METHANE	28.313					
ETHANE	5.941					
ETHYLENE						
PROPANE	5.330					
PROPYLENE						
i-BUTANE	1.501					
n-BUTANE	2.891					
i-PENTANE	0.943					
n-PENTANE	0.625					
C_6+ as N-C_6	0.934					
O_2						
N_2	0.230					
CO						
CO_2	0.201					
SPECIFIC GRAVITY	0.496					
GROSS BTU/CU. FT.	947.6					
FUEL OIL EQ. BBL/MCF	0.152					
EQ.LIQ.CONTENT BBL/MCF	0.357					

cc:		Remarks:
L. Amidei	B. Millar	
D. Hall	R. Rice	
T. Goad	Control Rm	
C. Johnson	R. Scott	
	C. Jhc	

5-6

Getty Refining and Marketing Co.
Bakersfield Refinery

GAS ANALYSIS BY GAS CHROMATOGRAPHY

Analyst: Joseph Selgrath
Unit: Refinery Fuel Gas
Date: 8/11/81

SAMPLE SOURCE	15-U-15					
SAMPLE TIME	2⁰⁰ PM					
PERCENT	Mole					
HYDROGEN	50.730					
METHANE	34.459					
ETHANE	4.989					
ETHYLENE						
PROPANE	4.615					
PROPYLENE						
i-BUTANE	1.019					
n-BUTANE	2.064					
i-PENTANE	0.367					
n-PENTANE	0.263					
C_6+ as N-C_6	0.383					
O_2						
N_2	0.828					
CO						
CO_2	0.273					
SPECIFIC GRAVITY	0.449					
GROSS BTU/CU. FT.	860.7					
FUEL OIL EQ. BBL/MCF	0.138					
EQ.LIQ.CONTENT BBL/MCF	0.342					

cc:
L. Amidei
D. Hall
T. Goad
C. Johnson
B. Millar
R. Rice
Control Rm
R. Scott
C. Thompson

Remarks:

5-7

Refining and Marketing Co.
Bakersfield Refinery

GAS ANALYSIS BY GAS CHROMATOGRAPHY

Analyst: Joseph Solgrath

Unit: REFINERY FUEL GAS

Date: 8/13/81

SAMPLE SOURCE	15-U-15					
SAMPLE TIME	2 00 pm					
PERCENT	Mole					
HYDROGEN	53.623					
METHANE	29.696					
ETHANE	5.902					
ETHYLENE						
PROPANE	5.634					
PROPYLENE	0.003					
i-BUTANE	1.496					
n-BUTANE	2.080					
i-PENTANE	0.486					
n-PENTANE	0.328					
C_6+ as N-C_6	0.289					
O_2						
N_2	0.240					
CO						
CO_2	0.223					
SPECIFIC GRAVITY	0.455					
GROSS BTU/CU. FT.	882.8					
FUEL OIL EQ. BBL/MCF	0.141					
EQ.LIQ.CONTENT BBL/MCF	0.346					

CC:
L. Amidei
D. Hall
T. Goad
C. Johnson
B. Millar
R. Rice
Control Rm
R. Scott
C. Thompson

Remarks:

5-8

5.2 PARTICULATE EMISSIONS FROM METHOD 5 AND 17

7602.71
CMEA: MOHAWK
BAKERSFIELD
CA

Test ID	Front Half						Back Half		
	V_m (std)	Nozzle Catch (mg)[a]	In Stack Filter (mg)[a]	Probe Catch (mg)[a]	M-5 Filter (mg)[a]	Impinger Rinse (Acetone) (mg)[a]	Aqueous Phase (mg)[a]	Organic Phase (mg)[a]	Aqueous Wash of Organic Phase (mg)[a]
M-5/17 Test no. 1	70.277	4.38	6.04 5.91	1.50	19.17	6.57	72.44	16.45	6.85
M-5/17 Test no. 2	64.915	1.09	4.98 0.04	6.87	0.38	3.20	1,352.84	0.54	0.67

[a] Blank corrected

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ACUREX
ANALYTICAL REPORT

Sample of: Mohawk

Sample Date: August 11 and 13, 1981

Requested By: Bruce Daros

I.D. Number: 7602.72/CMEA

Analytical Method: Gravimetric Analysis of Method 5/17 Filters

Date of Analysis: August 25 and 26, 1981; September 14 and 15, 1981

Lab I.D. Number	Component	Analytical Result	Unit
m5/17 813830 - Test #1	142-233 Filter	1.01608 - 1.03525	19.17
m5/17 813856 - Test #2	142-225 Filter	1.03978 - 1.03940	0.38
NH_4 - 011) Test 1	4.7cm Filter	0.11946 - .113425	Final 6.04 Filter 5.91
NH_4 - 012	"	0.12034 - .114435	Weights*
NH_4 - 013) Test 2	"	0.11779 - .11281	4.98
NH_4 - 014	"	0.11352 - .11348	0.04
NH_4 - 015 BLANK	"	0.11836 - .22383	- 105.47

*Note: THESE NUMBERS ARE NOT NET GAIN. Tare weights were unavailable at the time this report was written.

Analysis By J. Sayer, L. Whitmer

Date 9/15/81

ACUREX
ANALYTICAL REPORT

Sample of: Mohawk

Sample Date: August 11 and 13, 1981

Requested By: Bruce Daros

I.D. Number: 7602.70 /CMEA

Analytical Method: Gravimetric Analysis of Acetone Probe and Nozzle Washes

Date of Analysis: September 14 and 15, 1981

Lab I.D. Number	Component	Analytical Result	Unit
813806 - Test 1 Probe Wash —	24 mls	1.57 -.0663 = 1.50	Net Gain milligrams
813830 - Test 1 Nozzle Rinse Filter + nozzle R	16 mls	4.42 -.0442 = 4.38	
813812 - Test 2 ✓ Probe Wash	28 mls	6.95 -.0773 = 6.87	
813867 - Test 2 ✓ Nozzle Rinse	9 mls	1.11 -.0193 = 1.09	
813862 - Acetone Blank (Field)	210 mls.	0.58 .00276 mg/ml	
~~Lab - Acetone Blank~~	~~100 mls~~	~~0.85~~	
813862 - Water Blank (Field)	158 mls	1.22	

Analysis By L. Whitmer

Date September 16, 1981

ACUREX
ANALYTICAL REPORT

Sample of: Mohawk
Sample Date: August 11 and 13, 1981
Requested By: Bruce Daros
I.D. Number: 7602.70/CMEA

Analytical Method: EPA Method 5 Protocol - Ether/Chloroform Extraction of Impingers
Date of Analysis: September 8 thru 16, 1981

Lab I.D. Number	Component	Analytical Result	Unit
813804 - TEST #1 Imp contents	459 mls		
- Aqueous Phase		72.83 - .3856 = 72.44	Net Gain
- Organic Phase		16.98 - .5324 = 16.45	milligrams
- Aqueous Wash of Organic Phase		7.28 - .4223 = 6.86	
813807 - TEST # 2 Imp contents	470 mls		
- Aqueous Phase		1352.23 - .3948 = 1352.84	
- Organic Phase		1.08 - .5452 = .5348	
- Aqueous Wash of Organic Phase		1.10 - .4324 = .67	
Lab Blank water blank	500 mls		
- Aqueous Phase		0.42 .00084/ml	Blank Correction Factor mg/ml
- Organic Phase		0.58 .00116	
- Aqueous Wash of Organic Phase		0.46 .00092	

Analysis By J. Sayer / L. Whitme

Date September 16, 1981

ACUREX
ANALYTICAL REPORT

Sample of: Mohawk

Sample Date: August 11 and 13, 1981

Requested By: Bruce DaRos

I.D. Number: 7602.70/CMEA

Analytical Method: EPA Method 5 Protocol - Ether/Chloroform Extraction of Impinger Rinse

Date of Analysis: Sept. 16, 22, 25 and 28, 1981

Lab I.D. Number	Component	Analytical Result	Unit
813803- Test 1 Organic Fraction Imp acetone Rinse	80 mls	6.79 -.221	= 6.57 Net Gain milligrams
813813- Test 2 Organic Fraction Imp acetone Rinse	45 mls	3.32 -.124 =	3.20

Analysis By L. Whitmer

Date September 28, 1981

Form EED- 082 5/81

5.3 PARTICULATE EMISSIONS FROM SASS SAMPLES

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ACUREX Corporation
ANALYSIS LABORATORIES

DATA REPORTING FORM

CUSTOMER Acurex Env. Eng.
DATE
CUSTOMER CONTRACT NO. 307605.72
ACUREX CONTRACT NO. A81-09-007
RESULTS REPORT TO L. Waterland
TELEPHONE
ADDRESS
Mohawk I = 24.99 dscm II = 25.52 dscm

SAMPLE ID (CUSTOMER)	Probe-I	Filter-I	Prob-II	Filter-II						
SAMPLE ID (LAB)	486	485	051	493						
PARAMETER										UNITS
Weight	16.1	195.1	10.4	221.6						mg

ANALYST
REVIEWER

Form EED-057 4/80

5.4 SULFUR OXIDE EMISSIONS FROM CONTROLLED CONDENSATION SAMPLES

CONTROLLED CONDENSATION SYSTEM (CCS)
LABORATORY DATA SHEET

Plant Getty/MOHAWK
Date 8-13-81
Sample Location B-2
Run No. CCS-2

Analyst B. C. DaRos
Date Lab Analysis Completed 10-21-81

Titration Data

Method ______ Titrant H_2SO_4 Normality 0.0166 Indicator Barium Thorin

Sample Description	Probe, Nozzle and Filter Rinse			G/R Coil Rinse			Impinger Contents and Rinse			H_2O Blank			3% H_2O_2 Blank		
Sample No.	813809			813808			813811			813796			813810		
Vol. of Sample, ml	74			67			230								
Vol. of Aliquot				10	10	1	10						10		
Vol. of Titrant Used				5.45	5.60	0.60	7.45	8.6	10.80 9.3				0.05	0.05	
Average Vol. of Titrant Used	1/			5.525			2/		10.05 3/	1/			0.05		

Calculations

Vol. of Gas Sampled (V_M) 21.20 ft³, Avg. Meter Temp (T_M) 92.7 °F,
Meter Pressure (P_M) 29.43 "Hg, Meter α Factor 1.006 dimensionless
$29.42 + \frac{0.1}{13.6} = 29.43$

$$PPM\ SO_4 = \frac{48.15\ ([illegible]\ MgSO_4)(92.7,\ T_M+460)}{96\ (21.20,\ V_M)(29.43,\ P_M)}\ (1.006, \alpha)$$

ppm SO_4 = 13

$$PPM\ SO_2 = \frac{48.15\ (\overset{122.2}{\cancel{[illegible]}},\ MgSO_2)(92.7,\ T_M+460)}{64\ (21.20,\ V_M)(29.43,\ P_M)}\ (1.006, \alpha)$$

ppm SO_2 = 82

1/ Pink upon addition of Thorin
2/ Very poor end point
3/ DOWEX exchanged

5.5 TRACE ELEMENT ANALYSES

ACUREX Corporation

Energy & Environmental Division

CMEA/Hg

November 3, 1981
Acurex Lab ID#: A81-10-024
Client P.O.#: 307605.72

ATTENTION: L. Waterland

Samples: 4 oils, received 10/21/81

The above referenced samples were analyzed for mercury by Parr-bombing 1 gram of each sample and using atomic absorption spectrometry in the cold-vapor mode.

Sample	µg Hg per gram of fuel
Mohawk I #822	0.02
Mohawk II #864	0.01

Prepared by: John Labash
Staff Chemist

Approved by: Greg Nicoll
Quality Assurance Manager

JL/GN:es

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ACUREX Corporation
ANALYSIS LABORATORIES

DATA REPORTING FORM

CUSTOMER Acurex Env. Eng.
DATE
CUSTOMER CONTRACT NO. 307605.72
ACUREX CONTRACT NO. A81-09-007
RESULTS REPORT TO L. Waterland
TELEPHONE
ADDRESS
Mohawk I = 24.99 dscm II = 25.52 dscm

SAMPLE ID (CUSTOMER)	Filter-I	XAD-I	Imp 1-I	Imp 2&3-I	Filter-II	XAD-II	Imp 1-II	Imp 2&3 II		
SAMPLE ID (LAB)	485	488	490	491	493	495	497	498		
PARAMETER										UNITS
TCO-Aliquot	—	2.1, 2.7	—	—	—	1.0, 1.2	—	—		mg
TCO-Blank Aliquot	—	0.11	—	—	—	0.11	—	—		mg
TCO	—	0.09, 0.11	—	—	—	0.038, 0.047	—	—		mg/dscm
GRAV-Aliquot	10	37	—	—	8	12	—	—		mg
GRAV-Blank Aliquot	6	8	—	—	6	8	—	—		mg
GRAV	<0.5	1.3	—	—	<0.5	<0.3	—	—		mg/dscm
Mercury-Aliquot	<0.9	2.5	1.4, 1.3	<0.9	<0.9	4.1	1.1, 1.5	<0.9		µg/l
Mercury-Blank Aliquot	<0.9	3.2	<0.9	<0.9	<0.9	3.2	<0.9	<0.9		µg/l
Mercury	<0.01	<0.8	0.1, 0.1	<0.1	<0.1	<0.8	0.1, 0.2	<0.09		µg/dscm

ANALYST

REVIEWER

Form FED-057 4/80

ACUREX Corporation
ANALYSIS LABORATORIES

DATA REPORTING FORM

CUSTOMER Acurex Env. Eng.
DATE
CUSTOMER CONTRACT NO. 307605.72
ACUREX CONTRACT NO. A81-09-007
RESULTS REPORT TO L. Waterland
TELEPHONE
ADDRESS
Mohawk I = 24.99 dscm II = 25.52 dscm

SAMPLE ID (CUSTOMER)	Imp 2&3-I	Imp 2&3 II								
SAMPLE ID (LAB)	491	498								
PARAMETER										**UNITS**
Arsenic-Aliquot	<20	<20								µg/l
Arsenic-Blank Aliquot	<20	<20								µg/l
Arsenic	<2	<2								µg/dscm
Antimony-Aliquot	<5	<5								µg/l
Antimony-Blank Aliquot	<5	<5								µg/l
Antimony	<0.5	<0.5								µg/dscm

ANALYST
REVIEWER

Form EED-057 4/80

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST 44TH AVENUE, GOLDEN, COLORADO 80401, PHONE: 303-278-9521

To: Mr. Roy Belletto
Acurex Corporation
485 Clyde Street
Mountain View, CA 94042

Release No. 7

Date: December 29, 1981

Analyst: J. Oldham

P. O. No.:

Sample No.: 10-24-2
CTE 822

[illegible] 1 feed

IAD No.: 97-H690-116-13

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	<0.5	Terbium		Ruthenium		Vanadium	23
Thorium	<0.7	Gadolinium		Molybdenum		Titanium	9
Bismuth		Europium		Niobium		Scandium	<0.1
Lead	0.6	Samarium		Zirconium	0.5	Calcium	58
Thallium		Neodymium		Yttrium		Potassium	93
Mercury	NR	Praseodymium		Strontium	0.1	Chlorine	10
Gold		Cerium		Rubidium		Sulfur	240
Platinum	0.8	Lanthanum		Bromine	0.7	Phosphorus	33
Iridium		Barium		Selenium		Silicon	65
Osmium		Cesium		Arsenic		Aluminum	25
Rhenium		Iodine		Germanium		Magnesium	33
Tungsten	≤0.7	Tellurium		Gallium	0.4	Sodium	≤0.2
Tantalum		Antimony		Zinc	5	Fluorine	≈3
Hafnium		Tin		Copper	230	Oxygen	NR
Lutetium		Indium	STD	Nickel	54	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	≤0.1	Carbon	NR
Thulium		Silver		Iron	41	Boron	0.3
Erbium		Palladium		Manganese	2	Beryllium	
Holmium		Rhodium		Chromium	0.9	Lithium	2
Dysprosium						Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.1ppm
MC — Major Component
INT — Interference

Approved: Robert L. Taylor
for ML Jacobs 29 Dec 81

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST 44TH AVENUE, GOLDEN, COLORADO 80401, PHONE: 303-278-9521

To: Mr. Roy Belletto
Acurex Corporation
485 Clyde Street
Mountain View, CA 94042

Release No. 7

Date: December 29, 1981

Analyst: J. Oldham

P. O. No.:

Sample No.: 10-24-1
CTE 864

IAD No.: 97-H690-116-13

Mohawk 2 Fuel

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	≤1	Terbium		Ruthenium		Vanadium	14
Thorium	≤0.7	Gadolinium		Molybdenum		Titanium	9
Bismuth		Europium		Niobium		Scandium	<0.1
Lead	0.6	Samarium		Zirconium		Calcium	26
Thallium		Neodymium		Yttrium	≤0.1	Potassium	100
Mercury	NR	Praseodymium		Strontium	0.1	Chlorine	6
Gold		Cerium		Rubidium		Sulfur	>470
Platinum	*20	Lanthanum		Bromine	1	Phosphorus	6
Iridium		Barium		Selenium		Silicon	650
Osmium		Cesium		Arsenic		Aluminum	25
Rhenium		Iodine		Germanium		Magnesium	15
Tungsten		Tellurium		Gallium	0.3	Sodium	0.9
Tantalum		Antimony		Zinc	2	Fluorine	≈0.7
Hafnium		Tin		Copper	100	Oxygen	NR
Lutetium		Indium	STD	Nickel	270	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	≤0.1	Carbon	NR
Thulium		Silver		Iron	46	Boron	<0.1
Erbium		Palladium		Manganese	4	Beryllium	
Holmium		Rhodium		Chromium	2	Lithium	0.3
Dysprosium						Hydrogen	NR

* Heterogeneous

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.1ppm
MC — Major Component
INT — Interference

Approved: Robert C. Taylor
for M. L. Jacobs 29 Dec 81

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST 44TH AVENUE, GOLDEN, COLORADO 80401, PHONE: 303-278-9521

To: Mr. Roy A. Belletto
Acurex Corp.
485 Clyde Ave.
Mountain View, CA 94042

Date: December 4, 1981

Release No. 7
P. O. No.: Subcontract No. SW59159A

Analyst: J. Oldham

Sample No.: 9-7 481

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN PPM WEIGHT

IAD No.: 97-H690-116-13

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.1
Thorium		Gadolinium		Molybdenum	≤0.9	Titanium	2
Bismuth		Europium		Niobium		Scandium	
Lead		Samarium		Zirconium	0.5	Calcium	59
Thallium		Neodymium		Yttrium		Potassium	9
Mercury	NR	Praseodymium		Strontium	0.9	Chlorine	3
Gold		Cerium		Rubidium		Sulfur	22
Platinum	1	Lanthanum		Bromine	2	Phosphorus	3
Iridium		Barium	2	Selenium		Silicon	27
Osmium		Cesium		Arsenic	≤0.2	Aluminum	0.9
Rhenium		Iodine	0.2	Germanium		Magnesium	3
Tungsten		Tellurium		Gallium	0.4	Sodium	10
Tantalum		Antimony		Zinc	3	Fluorine	≈6
Hafnium		Tin		Copper	1	Oxygen	NR
Lutetium		Indium	STD	Nickel	1	Nitrogen	NR
Ytterbium		Cadmium		Cobalt		Carbon	NR
Thulium		Silver	3	Iron	4	Boron	0.1
Erbium		Palladium		Manganese	0.4	Beryllium	
Holmium		Rhodium		Chromium	0.8	Lithium	0.1
Dysprosium						Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.2 ppm
MC — Major Component
INT — Interference

Approved: M.L. Jacobs by
4 Dec 81.

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST 44TH AVENUE, GOLDEN, COLORADO 80401, PHONE: 303-278-9521

To: Mr. Roy A. Belletto
Acurex Corp.
485 Clyde Ave.
Mountain View, CA 94042

Date: December 4, 1981

Analyst: J. Oldham

Release No. 7
P. O. No.: Subcontract No. SW59159A

Sample No.: 9-7 495

IAD No.: 97-H690-116-13

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	<0.1
Thorium		Gadolinium		Molybdenum	≤0.9	Titanium	9
Bismuth		Europium		Niobium		Scandium	
Lead		Samarium		Zirconium	0.5	Calcium	48
Thallium		Neodymium		Yttrium		Potassium	*97
Mercury	NR	Praseodymium		Strontium	0.4	Chlorine	0.6
Gold		Cerium		Rubidium		Sulfur	2
Platinum	*8	Lanthanum		Bromine	0.7	Phosphorus	1
Iridium		Barium	4	Selenium		Silicon	12
Osmium		Cesium		Arsenic	0.2	Aluminum	0.4
Rhenium		Iodine		Germanium		Magnesium	3
Tungsten		Tellurium		Gallium	0.4	Sodium	10
Tantalum		Antimony		Zinc	2	Fluorine	≈1
Hafnium		Tin		Copper	0.5	Oxygen	NR
Lutetium		Indium	STD	Nickel	1	Nitrogen	NR
Ytterbium		Cadmium		Cobalt		Carbon	NR
Thulium		Silver	*1	Iron	2	Boron	<0.1
Erbium		Palladium		Manganese	0.4	Beryllium	
Holmium		Rhodium		Chromium	<0.1	Lithium	<0.1
Dysprosium						Hydrogen	NR

* Heterogeneous

STD — Internal Standard
NR — Not Reported
All elements not detected <0.1 ppm
MC — Major Component
INT — Interference

Approved: M.L. Jacobs by
4 Dec '81

RECEIVED DEC 8 1981

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST 44TH AVENUE, GOLDEN, COLORADO 80401, PHONE: 303-278-9521

To: Mr. Roy A. Belletto
Acurex Corp.
485 Clyde Ave.
Mountain View, CA 94042

Date: December 4,1981

Analyst: J. Oldham

Release No. 7
P. O. No.: Subcontract No. SW59159A

Sample No.: 9-7 487

IAD No.: 97-H690-116-13

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.6
Thorium		Gadolinium		Molybdenum	4	Titanium	11
Bismuth		Europium		Niobium		Scandium	
Lead		Samarium		Zirconium	1	Calcium	70
Thallium		Neodymium		Yttrium		Potassium	23
Mercury	NR	Praseodymium		Strontium	3	Chlorine	16
Gold		Cerium	3	Rubidium		Sulfur	28
Platinum	4	Lanthanum		Bromine	32	Phosphorus	6
Iridium		Barium	4	Selenium		Silicon	*130
Osmium		Cesium		Arsenic		Aluminum	*7
Rhenium		Iodine		Germanium		Magnesium	4
Tungsten	20	Tellurium		Gallium	0.8	Sodium	5
Tantalum		Antimony		Zinc	2	Fluorine	≈13
Hafnium		Tin		Copper	5	Oxygen	NR
Lutetium		Indium	STD	Nickel	3	Nitrogen	NR
Ytterbium		Cadmium		Cobalt		Carbon	NR
Thulium		Silver	380	Iron	9	Boron	<0.1
Erbium		Palladium		Manganese	2	Beryllium	
Holmium		Rhodium		Chromium	0.6	Lithium	0.4
Dysprosium		* Heterogeneous				Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.3 ppm
MC — Major Component
INT — Interference

Approved: M.L. Jacobs by
4 Dec 81

RECEIVED NOV 2 5 1981

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST 44TH AVENUE, GOLDEN, COLORADO 80401, PHONE: 303-278-9521

To: Mr. Roy A. Belletto
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Date: November 20, 1981

Analyst: J. Oldham

P. O. No.:

Sample No.: 493
Release No. 7

IAD No.: 97-H690-116-13

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

CONCENTRATION IN µg/cm^2

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	0.07	Terbium	0.009	Ruthenium		Vanadium	MC
Thorium	0.1	Gadolinium	0.02	Molybdenum	0.02	Titanium	MC
Bismuth	0.002	Europium	0.02	Niobium	0.1	Scandium	0.05
Lead	1	Samarium	0.06	Zirconium	0.4	Calcium	MC
Thallium		Neodymium	0.09	Yttrium	0.3	Potassium	MC
Mercury	NR	Praseodymium	0.04	Strontium	1	Chlorine	INT
Gold		Cerium	0.5	Rubidium	0.02	Sulfur	>5
Platinum		Lanthanum	0.2	Bromine	0.2	Phosphorus	3
Iridium		Barium	8	Selenium	0.05	Silicon	*MC
Osmium		Cesium	0.001	Arsenic	0.4	Aluminum	>0.8
Rhenium		Iodine	0.008	Germanium	0.008	Magnesium	MC
Tungsten	≤0.008	Tellurium	0.005	Gallium	1	Sodium	>2
Tantalum		Antimony	0.05	Zinc	2	Fluorine	INT
Hafnium	0.05	Tin	0.07	Copper	MC	Oxygen	NR
Lutetium	0.002	Indium	STD	Nickel	MC	Nitrogen	NR
Ytterbium	0.02	Cadmium	0.006	Cobalt	MC	Carbon	NR
Thulium	0.002	Silver		Iron	MC	Boron	0.03
Erbium	0.02	Palladium		Manganese	0.2	Beryllium	0.001
Holmium	0.02	Rhodium		Chromium	0.9	Lithium	0.1
Dysprosium	0.04					Hydrogen	NR

* Probable loss of element through evolution of SiF_4. Sample + filter dissolved in a solution of ultra-pure aqua-regia + HF.

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.001 µg/cm^2
MC — Major Component > 10 µg/cm^2
INT — Interference

Approved: M Jacobs

RECEIVED NOV 2 5 1981

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST 44TH AVENUE, GOLDEN, COLORADO 80401, PHONE: 303-278-9521

To: Mr. Roy A. Belletto
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Date: November 20, 1981

Analyst: J. Oldham

P. O. No.:

Sample No.: 485
Release No. 7

IAD No.: 97-H690-116-13

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN $\mu g/cm^2$

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	0.04	Terbium	0.006	Ruthenium		Vanadium	>8
Thorium	0.2	Gadolinium	0.02	Molybdenum	0.003	Titanium	MC
Bismuth	<0.001	Europium	0.007	Niobium	0.01	Scandium	0.01
Lead	0.09	Samarium	0.04	Zirconium	1	Calcium	MC
Thallium		Neodymium	0.06	Yttrium	0.7	Potassium	>6
Mercury	NR	Praseodymium	0.04	Strontium	0.8	Chlorine	INT
Gold		Cerium	0.3	Rubidium	0.01	Sulfur	>3
Platinum		Lanthanum	0.2	Bromine	0.05	Phosphorus	0.9
Iridium		Barium	0.009	Selenium	0.08	Silicon	*MC
Osmium		Cesium	0.003	Arsenic	0.9	Aluminum	>0.5
Rhenium		Iodine	0.01	Germanium	0.01	Magnesium	MC
Tungsten	≤0.02	Tellurium	0.02	Gallium	0.8	Sodium	>1
Tantalum	≤0.002	Antimony	0.04	Zinc	0.8	Fluorine	INT
Hafnium	0.1	Tin	0.03	Copper	MC	Oxygen	NR
Lutetium	0.001	Indium	STD	Nickel	MC	Nitrogen	NR
Ytterbium	0.01	Cadmium	0.004	Cobalt	>8	Carbon	NR
Thulium	0.002	Silver	0.02	Iron	MC	Boron	0.1
Erbium	0.005	Palladium		Manganese	0.1	Beryllium	<0.001
Holmium	0.006	Rhodium		Chromium	1	Lithium	0.07
Dysprosium	0.01					Hydrogen	NR

* Probable loss of element through evolution of SiF_4. Sample + filter dissolved in a solution of ultra-pure aqua-regia + HF.

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.001 $\mu g/cm^2$
MC — Major Component > 10 $\mu g/cm^2$
INT — Interference

Approved: M J Jacobs

RECEIVED NOV 2 5 1981

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST 44TH AVENUE, GOLDEN, COLORADO 80401, PHONE: 303-278-9521

To: Mr. Roy A. Belletto
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Date: November 20, 1981

Analyst: J. Oldham

P. O. No.:

Sample No.: 478
Release No. 7

IAD No.: 97-H690-116-13

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

CONCENTRATION IN μg/cm^2

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	0.04	Terbium	0.02	Ruthenium		Vanadium	0.3
Thorium	0.2	Gadolinium	0.06	Molybdenum	0.01	Titanium	MC
Bismuth		Europium	0.01	Niobium	0.3	Scandium	0.03
Lead	0.09	Samarium	0.08	Zirconium	1	Calcium	MC
Thallium		Neodymium	0.06	Yttrium	0.7	Potassium	>6
Mercury	NR	Praseodymium	0.06	Strontium	2	Chlorine	INT
Gold		Cerium	0.3	Rubidium	0.01	Sulfur	0.2
Platinum		Lanthanum	0.2	Bromine	0.02	Phosphorus	0.8
Iridium		Barium	5	Selenium	0.007	Silicon	*0.8
Osmium		Cesium	<0.001	Arsenic	≤0.002	Aluminum	>0.5
Rhenium		Iodine	0.006	Germanium	0.001	Magnesium	MC
Tungsten	0.009	Tellurium	0.004	Gallium	0.04	Sodium	>1
Tantalum		Antimony	0.02	Zinc	0.08	Fluorine	INT
Hafnium	0.1	Tin	0.03	Copper	0.01	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.09	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.004	Carbon	NR
Thulium	<0.001	Silver		Iron	MC	Boron	0.05
Erbium	0.01	Palladium		Manganese	0.06	Beryllium	<0.001
Holmium	0.02	Rhodium		Chromium	0.5	Lithium	0.03
Dysprosium	0.02					Hydrogen	NR

* Probable loss of element through evolution of SiF_4. Sample + filter dissolved in a solution of ultra-pure aqua-regia + HF.

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.001 μg/cm^2
MC — Major Component > 10 μg/cm^2
INT — Interference

Approved: MJ Jacobs

RECEIVED NOV 2 3 1981

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST 44TH AVENUE, GOLDEN, COLORADO 80401, PHONE: 303-278-9521

To: Mr. Roy Belletto
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Date: November 17, 1981

Analyst: J. Oldham

Release No. 7
P. O. No.: Subcontract No. SW59159A

Sample No.: 490 1st imp

IAD No.: 97-H690-116-13

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN µg/ml

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.002
Thorium		Gadolinium		Molybdenum	0.1	Titanium	0.1
Bismuth		Europium		Niobium	≤0.003	Scandium	≤0.003
Lead	0.05	Samarium		Zirconium	0.008	Calcium	6
Thallium		Neodymium		Yttrium	0.002	Potassium	2
Mercury	NR	Praseodymium		Strontium	0.02	Chlorine	4
Gold		Cerium		Rubidium	≤0.02	Sulfur	MC
Platinum		Lanthanum		Bromine	0.2	Phosphorus	0.04
Iridium		Barium	0.07	Selenium		Silicon	0.9
Osmium		Cesium		Arsenic	0.001	Aluminum	0.006
Rhenium		Iodine		Germanium		Magnesium	0.1
Tungsten		Tellurium		Gallium	0.01	Sodium	MC
Tantalum		Antimony		Zinc	0.8	Fluorine	4
Hafnium		Tin	0.02	Copper	0.4	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.1	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.005	Carbon	NR
Thulium		Silver	2	Iron	0.7	Boron	0.007
Erbium		Palladium		Manganese	0.003	Beryllium	
Holmium		Rhodium		Chromium	0.08	Lithium	0.004
Dysprosium						Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.002 µg/ml
MC — Major Component > 10 µg/ml
INT — Interference

Approved: M.L. Jacobs by [illegible] 18 Nov 81 cc: L Waterland

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST 44TH AVENUE, GOLDEN, COLORADO 80401, PHONE: 303-278-9521

To: Mr. Roy Belletto
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Date: November 17, 1981

Release No. 7
P. O. No.: Subcontract No. SW59159A

Analyst: J. Oldham

Sample No.: 482 B
1st imp

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN μg/ml

IAD No.: 97-H690-116-13

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.001
Thorium		Gadolinium		Molybdenum	0.01	Titanium	0.03
Bismuth		Europium		Niobium		Scandium	<0.001
Lead	0.01	Samarium		Zirconium	0.006	Calcium	1
Thallium		Neodymium		Yttrium		Potassium	2
Mercury	NR	Praseodymium		Strontium	0.008	Chlorine	0.2
Gold		Cerium	≤0.001	Rubidium	0.003	Sulfur	0.1
Platinum		Lanthanum		Bromine	0.2	Phosphorus	0.2
Iridium		Barium	0.01	Selenium	0.002	Silicon	0.8
Osmium		Cesium		Arsenic	<0.001	Aluminum	*0.05
Rhenium		Iodine	0.001	Germanium		Magnesium	*0.2
Tungsten		Tellurium		Gallium	<0.001	Sodium	*>2
Tantalum		Antimony		Zinc	0.06	Fluorine	0.03
Hafnium		Tin	0.06	Copper	0.01	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.006	Nitrogen	NR
Ytterbium		Cadmium	≤0.001	Cobalt	≤0.001	Carbon	NR
Thulium		Silver	0.3	Iron	0.09	Boron	<0.001
Erbium		Palladium		Manganese	0.002	Beryllium	
Holmium		Rhodium		Chromium	0.008	Lithium	<0.001
Dysprosium						Hydrogen	NR

* Heterogeneous

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.001 μg/ml
MC — Major Component > 10 μg/ml
INT — Interference

Approved: M.L. Jacobs by [illegible] 18 Nov '81

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST 44TH AVENUE, GOLDEN, COLORADO 80401, PHONE: 303-278-9521

To: Mr. Roy Belletto
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Date: November 18, 1981

Analyst: J. Oldham

P. O. No.: Release No. 7
Subcontract No. SW59159A

Sample No.: 497 1st imp

IAD No.: 97-H690-116-13

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN µg/ml

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	<0.001
Thorium		Gadolinium		Molybdenum	0.01	Titanium	*0.3
Bismuth		Europium		Niobium		Scandium	<0.001
Lead	0.009	Samarium		Zirconium	0.003	Calcium	0.4
Thallium		Neodymium		Yttrium		Potassium	2
Mercury	NR	Praseodymium		Strontium	0.008	Chlorine	0.2
Gold		Cerium	<0.001	Rubidium	0.002	Sulfur	MC
Platinum		Lanthanum		Bromine	0.04	Phosphorus	0.004
Iridium		Barium	0.02	Selenium	0.003	Silicon	0.4
Osmium		Cesium	*<0.001	Arsenic	<0.001	Aluminum	0.02
Rhenium		Iodine		Germanium		Magnesium	0.02
Tungsten		Tellurium		Gallium	0.002	Sodium	MC
Tantalum		Antimony		Zinc	0.1	Fluorine	*0.4
Hafnium		Tin	0.003	Copper	0.07	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.02	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	<0.001	Carbon	NR
Thulium		Silver	0.9	Iron	0.09	Boron	<0.001
Erbium		Palladium		Manganese	0.01	Beryllium	
Holmium		Rhodium		Chromium	0.05	Lithium	<0.001
Dysprosium		* Heterogeneous				Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected <0.001 µg/ml
MC — Major Component >10 µg/ml
INT — Interference

Approved: M.L. Jacobs by RE Taylor 18 Nov 81

5.6 AMMONIA ANALYSES

Method 5/17 Train Samples

Test	Sample	Sample ID	Alternate Sample ID	Volume (ml)
1	Nozzle rinse	813831	131	52
	Instack filter	$NH_4$011	139	130
	Instack filter	$NH_4$012	124	80
	Probe wash	813806	113	86
	Out-of-stack filter	813830	129	90
	Aqueous	813668	106	172
	Organic	813668	104	124
	Organic	813668	115	138
	Aqueous/aqueous	813804	100	190
	Aqueous/aqueous	813804	137	118
	Organic/organic	813804	107	120
	Aqueous/organic	813804	134	110
	Acetone impinger rinse	813803	105	112
	Chloroform extract	813803	135	110
	Ethyl ether extract	813803	130	96
2	Nozzle rinse	813867	118	64
	Instack filter	$NH_4$014	114	120
	Instack filter	$NH_4$013	127	80
	Probe wash	813812	112	110
	Out-of-stack filter	813856	138	110
	Aqueous	813714	110	132
	Organic	813714	133	54
	Organic	813714	136	112
	Aqueous/aqueous	813807	111	110
	Aqueous/aqueous	813807	117	74
	Organic/organic	813807	122	104
	Aqueous/organic	813807	128	80
	Acetone impinger rinse	813813	109	120
	Chloroform extract	813813	119	62
	Ethyl ether extract	813813	123	100
	Impinger rinse solids	813795	121	100

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Method 5/17 Train Blanks and Knowns

Sample	Sample ID	Volume (ml)
$NH_4$014 filter blank	101	125
0i1 N HCl blank	102	100
100 ppm $NaHSO_3$ blank	103	
Aqueous/organic lab blank	108	158
Acetone blank	116	20
Field water blank	120	60
Aqueous/aqueous lab blank	125	56
Organic/organic lab blank	126	102
Acetone blank/field	132	84

Ammonia Train Samples

Run	Sample	Sample ID	Initial Quantity	Split Sample ID	Quantity	Split Sample ID	Quantity
1	Filter	813829	1,000 ml	813308		813309	
	Probe wash	813820	100 ml				
	Sample line wash	813821	60 ml				
	Impinger 1 rinse	813814	186 ml				
	Impinger 2 and 3 rinse	813815	196 ml				
2	Filter	813819	1,000 ml	813310		813311	
	Probe wash	813823	70 ml	812194			
	Sample line wash	813824	45 ml	812195			
	Impinger 1 rinse	813817	189 ml	812192			
	Impinger 2 and 3 rinse	813818	154 ml	812193			
3	Filter	813855	1,000 ml	813312		813313	
	Probe wash	813851	40 ml				
	Sample line wash	813852	110 ml				
	Impinger 1 rinse	813853	172 ml				
	Impinger 2 and 3 rinse	813854	100 ml				
4	Filter	813857	1,000 ml	813814		813815	
	Probe wash	813858	85 ml				
	Sample line wash	813859	120 ml				
	Impinger 1 rinse	813860	180 ml	812196			
	Impinger 2 and 3 rinse	813874	180 ml				
5	Filter	813870	1,000 ml	813316		813317	
	Probe wash	813868	90 ml	812197			
	Sample line wash	813871	135 ml	812198			
	Impinger 1 rinse	813872	185 ml	812199			
	Impinger 2 and 3 rinse	813873	150 ml	812200			
6	Filter	813882	1,000 ml	813318		813319	
	Probe wash	813880	100 ml				
	Sample line wash	813881	85 ml				
	Impinger 1 rinse	813883	225 ml	812201			
	Impinger 2 and 3 rinse	813884	170 ml				

Ammonia Train Blanks and Knowns

Sample	Sample ID	Alternate Sample ID
Oil N HCl	813280	
Oil N H_2SO_4	812203	
Front filter digestate/0.1N HCl	813327	
Front filter blank	813366	813328/813329
0.1N HCl	813279	812202
Front filter blank	813265	813326/813327
10 μg/ml NH_3	813330	813331/812870

TELEPHONE (805) 327-8567

HORNKOHL LABORATORIES
A Division Of
OILWELL RESEARCH, INC.
714 TRUXTUN AVENUE
BAKERSFIELD, CALIFORNIA 93301

COPY

Date Sept. 4, 1981

Laboratory No2A 2361

Submitted by ACUREX CORPORATION
3700 Easton Dr., Suite 1
Bakersifeld, CA 93309

ATTN: Jim Sayer

Sample Water

Received Aug. 31, 1981

Marked
As shown below.

WATER ANALYSIS

Test No	Sample ID		mg/1 Ammonia as NH_3
① 813829	813308-1	-	0.34
– ② 813817	812192-A	-	5.8
– ③ 813823	812194-C	-	0.18
– ② 813818	812193-B	-	< 0.1
– ⑥ 813860	812196-E	-	830
	813329-56 813366 BLANK	-	0.68
	813331 -Known- 10µg/ml	-	12
– ⑤ 813872	812199-H	-	680
– ② 813824	812195-D-	-	19
	813315-4 - 813857 ④ –	-	0.77
	813317-5 - 813870 ⑤ –	-	11
	813319-6 - 813882 ⑥ –	-	0.85
	813327-55 - 813327 BLANK –	-	0.28
	813309-1 - 813829 ① –	-	0.73
	813311-2 - 813819 ② –	-	1.5
	813313-3 - 813855 ③ –	-	0.34
– ⑤ 813870	813316-5	-	0.45
– ④ 813857	813314-4	-	0.63
– ③ 813855	813312-3	-	0.28
– ② 813819	813310-2	-	0.35
	813330-OL - KNOWN 10µg/ml	-	12
– BLANK 813366	813328-OL FILTER	-	0.16
– BLANK 813265	813326-OL 7 FILTER	-	0.15
– ⑥ 813882	813318-6	-	1.2
– ⑤ 813873	812200-I	-	44
– ⑥ 813823	812201-J	-	330
	812870-M - KNOWN 5x10⁻⁴ N ORIGIN	-	10
– ⑤ 813871	812198-G	-	440
– ⑤ 813868	812197-F	-	24
– – 813279	812202-K – .1N HCR BLANK	-	1.0

Respectfully submitted,

Richard L. Penner

Richard L. Penner
Chief Chemist

TELEPHONE (805) 327-8567

HORNKOHL LABORATORIES

A Division Of
OILWELL RESEARCH, INC.
714 TRUXTUN AVENUE
BAKERSFIELD, CALIFORNIA 93301

Submitted by ACUREX CORPORATION
485 Clyde Ave.
Mountain View, CA 94042

Date Oct. 26, 1981

Laboratory No. 2A 2487

Sample Water

Received October 19, 1981

Marked As shown below.

WATER ANALYSIS

Sample I.D.		Ammonia, Mg/l as NH_3
813820	-	57
813853	-	1.2
813854	-	< 0.1
813852	-	6.6
813858	-	110
813859	-	830
813821	-	26
813817	-	7.6
813819	-	0.34
813881	-	11
813883	-	1,100
813280	-	0.51
813851	-	< 0.1
813814	-	**
813870	-	0.25
813815	-	0.15
813884	-	90
812203	-	< 0.1
813874	-	46
813880	-	< 0.1

** Sample accidently spilled. Please submit another sample if available.

Respectfully submitted,

Richard L Penner
Richard L. Penner
Chief Chemist

/j

TELEPHONE (805) 327-8567

HORNKOHL LABORATORIES
A Division Of
OILWELL RESEARCH, INC.
714 TRUXTUN AVENUE
BAKERSFIELD, CALIFORNIA 93301

COPY

Submitted by	ACUREX CORPORATION 485 Clyde Ave. Mountain View, CA 94042	Date	Oct. 26, 1981
		Laboratory No.	2A 2487
Sample	Water	Marked	As shown below.
Received	October 19, 1981		

WATER ANALYSIS

Sample I.D.		Ammonia, Mg/l as NH_3
813820	-	57
813853	-	1.2
813854	-	< 0.1
813852	-	6.6
813858	-	110
813859	-	830
813821	-	26
813817	-	7.6
813819	-	0.34
813881	-	11
813883	-	1,100
813280	-	0.51
813851	-	< 0.1
813814	-	**
813870	-	0.25
813815	-	0.15
813884	-	90
812203	-	< 0.1
813874	-	46
813880	-	< 0.1

** Sample accidently spilled. Please submit another sample if available.

Respectfully submitted,

Richard L. Penner

Richard L. Penner
Chief Chemist

/j

Bruce Oakes 22240

TELEPHONE (805) 327-8567

HORNKOHL LABORATORIES

A Division Of
OILWELL RESEARCH, INC.
714 TRUXTUN AVENUE
BAKERSFIELD, CALIFORNIA 93301

Submitted by SOURCE EVALUATION & ANALYSIS
3700 Easton, Suite 1
Bakersfield, CA 93309

Date Aug. 18, 1981

Laboratory No. 2A 2295

Sample Water

Received Aug. 13, 1981

Marked
#1- Imp #1 & Rinse Test #3
#2- HCL Test #2
#3- Imp #1 & Rinse 186 mls Test #1

WATER ANALYSIS

		#1	#2	#3
Test Performed			Milligrams/liter	
Ammonia	-	5.4	6.4	0.92

Respectfully submitted,

Richard L. Penner
Richard L. Penner
Chief Chemist

/j

DuRos

Source
Evaluation &
Analysis

October 13, 1981

Hornkohl Laboratories
714 Truxtun Avenue
Bakersfield, CA 93301

Attention: Mr. Richard L. Penner, Cheif Chemist

Dear Mr. Penner:

Enclosed, please find 20 samples for Ammonia (NH_3) analysis. They are identified as follows:

	ID #	DESCRIPTION	SAMPLE MATRIX	TOTAL SAMPLE VOL. (ML)
57.	813820	P.W. Test 1	.1N HCL	100
26.	813821	S.L.W. "	"	60
LOST	813814	I1&R "	"	186
0.15	813815	I2&R "	"	196
< 0.1	813851	P.W. Test 3	"	40
6.6	813852	S.L.W. "	"	110
1.2	813853	I1&R "	"	172
< 0.1	813854	I2&R "	"	100
110.	813858	P.W. Test 4	"	85
830.	813859	S.L.W. "	"	120
46.-	813874	I2&R "		180
< 0.1	813880	P.W. Test 6	.1N H_2SO_4	100
11.	813881	S.L.W. "	"	85
1100.	813883	I1&R "	"	225
90.	813884	I2&R "	"	170
0.51	813280	.1N HCL Blank	.1N HCL only	Unity
< 0.1mg	812203	.1N H_2SO_4 Blank	.1N H_2SO_4 only	Unity
0.25	813870	F.F. Test 5	.1N HCL	250
0.54	813819	F.F. Test 2	"	250
7.6	813817	I1&R Test 2	"	189

Results of analysis should be reported as mg/L of Ammonia as NH_3 and the final results should be forwarded to myself. Upon completion of the sample analysis, please notify Mr. Ralph Pape of the Acurex, Bakersfield Office (805-327-3146) and he will make arrangements to pick up the sample remainders from your facility.

If there are any questions, please do not hesitate to call me at 415-964-3200 ext. 3393.

Sincerely,

Bruce C. DaRos
Project Engineer

BCD/dlv

TELEPHONE (805) 327-8567

OILWELL RESEARCH, INC.
HORNKOHL LABORATORIES DIVISION
CHEMICAL AND TESTING ENGINEERS
714 TRUXTUN AVENUE
BAKERSFIELD, CALIFORNIA 93301

February 17, 1982

ATTN: Mr. Bruce C. DaRos
Source Evaluation and Analysis
485 Clyde Avenue
Mountain View, Ca. 94042

Dear Mr DaRos;

Enclosed please find the results of the Ammonia Analysis on the 40 samples which we received in December. I am sorry it took so long to get these to you and that I was unable to provide the Sulfate, Bisulfate Information you requested.

The procedure I tried was to determine the pH of the sample as received and then add an excess of Barium Chloride. This precipitates the Barium Sulfate out of solution from both the sulfates and bisulfates. At that point the liberated Hydrogens which depressed the pH are back titrated with standard base to the original pH. The total sulfates are then filtered out, dried and weighed and the calculated bisulfate value from the titration is subtracted to leave a sulfate value.

Unfortunately, the titration indicated more bisulfate in my standard than was actually there. Apparently I was titrating more than just the liberated hydrogens from the bisulfate.

If you or your laboratory have any ideas as to how to analyze for those two constituents, we would be happy to try it, but at this point we haven't had much success.

Please advise me as to your wishes with regard to further analysis or return of the samples. I've tried reaching you by phone several times without success.

Sincerely,

Richard L. Penner
Chief Chemist

RLP/s

Evaluation &
Analysis

December 11, 1981

Hornkohl Laboratories
714 Truxtun Avenue
Bakersfield, CA 93301

Attention: Mr. Richard L. Penner, Chief Chemist

Dear Mr. Penner:

Enclosed please find 39 samples for ammonia (NH_3), sulfate (SO_4), and bisulfate (HSO_4) analysis identified 000100 through 000139. Each sample is in a 0.1N HCL solution matrix and is labeled with the total sample volume.

Results of analysis should be reported as mg/L of the appropriate component and the final results should be forwarded to myself. Upon completion of the sample analysis, please notify Mr. Ralph Pape of the Acurex Bakersfield Office (805-327-3146) and he will make arrangements to pick up the sample remainders from your facility. Send the billing along with the completed analysis report and I will expedite through the appropriate channels.

If there are any questions please do not hesitate to call me at 415-964-3200, ext. 3393.

Sincerely,

Bruce C. DaRos
Project Engineer

A DIVISION OF ACUREX CORPORATION
485 CLYDE AVENUE, MOUNTAIN VIEW, CA 94042 PHONE (415) 964-3200 TELEX 34-6391 TWX 910-3796593
7767 WEST 96TH PLACE, HICKORY HILLS, IL 60457 PHONE (312) 430-4545
3700 EASTON DRIVE, SUITE ONE, BAKERSFIELD, CA 93309 PHONE (805) 327-3146

TELEPHONE (805) 327-8567

HORNKOHL LABORATORIES
A Division Of
OILWELL RESEARCH, INC.
714 TRUXTUN AVENUE
BAKERSFIELD, CALIFORNIA 93301

COPY

Submitted by Accurex Corporation
485 Clyde Avenue Suite 1
Mountain View, Ca. 94942

ATTN: Bruce C. DaRos

Date February 17, 1982

Laboratory No. 2A 2650

Marked 40 Samples

Sample Ammonia

Received 12-13-81

AMMONIA ANALYSIS

Sample I.D. #	Milligrams/liter	Sample I.D.	Milligrams/liter
000100	5.2	000121	0.48
000101	5.5	000122	0.13
000102	* 0.1	000123	1.0
000103	* 0.1	000124	3.1
000104	* 0.1	000125	* 0.1
000105	* 0.1	000126	* 0.1
000106	0.17	000127	6.5
000107	1.3	000128	0.40
000108	* 0.1	000129	2.2
000109	1.9	000130	* 0.1
000110	0.36	000131	1.3
000111	1,800	000132	1.6
000112	5.4	000133	* 0.1
000113	* 0.1	000134	16
000114	0.5	000135	* 0.1
000115	* 0.1	000136	* 0.1
000116	* 0.1	000137	8.5
000117	1,450	000138	0.45
000118	* 0.1	000139	1.8
000119	* 0.1		
000120	* 0.1		

* INDICATES LESS THAN.

Respectfully Submitted,

Richard L. Penner

Richard L. Penner
Chief Chemist

s

CMEA: Mohawk/Ammonia Analysis Summary

Run	Sample No.	Sample Description	Sample Volume (ml)	Sample Weight (mg)	NH_3[a] (mg/L)	NH_3[b] (mg/sampled)	Gas Volume Sampled (ft^3)	T_M (°F)	P_M ("Ag)	NH_3 (ppm)	Blank Corrected (mg/ml)
1	913829	2 ed filter	N/A	5.93	0.34					1.13	
	813820	Probe wash	100		57.0	5.62	16.081	94.9	29.6	18.7	0.000755
	813821	Sample line wash	60		26.0	1.52				5.1	
	813814	Impinger 1 rinse	186		c					ND	
	813815	Impinger 2 rinse	196		0.15	0					
										24.93	
2	813819	2 ed filter	N/A	4.83	0.35					1.15	
	813823	Probe wash	70		0.18	0	16.154	101.8	29.6		
	813824	Sample line wash	45		19.0	0.82				2.75	0.000755
	813817	Impinger 1 rinse	189		5.8	0.95				3.19	
	813818	Impinger 2 rinse	154		<0.1	0					
										7.09	
3	813855	2 ed filter	N/A	5.45	0.28					0.89	
	813851	Probe wash	40		<0.1	0	17.257	105.6	29.55		0.000755
	813852	Sample line wash	110		6.6	0.64				2.03	
	813853	Impinger 1 rinse	172		1.2	0.08				0.25	
	813854	Impinger 2 rinse	100		<0.1	0					
										3.17	
4	813857	2 ed filter	N/A	3.60	0.63					1.98	
	813858	Probe wash	85		110.	9.29	17.184	94.5	29.36	29.18	0.000755
	813859	Sample line wash	120		830	99.51				312.59	
	813860	Impinger 1 rinse	180		830	149.26				494.43	
	813874	Impinger 2 rinse	180		46	8.14					
										838.18	

[a] Data as reported by lab
[b] Blank corrected
[c] Sample spilled at lab

CMEA: Mohawk/Ammonia Analysis Summary (Concluded)

Run	Sample No.	Sample Description	Sample Volume (ml)	Sample Weight (mg)	NH_3[a] (mg/L)	NH_3[b] (mg/sampled)	Gas Volume Sampled (ft^3)	T_M (°F)	P_M ("Ag)	NH_3 (ppm)	Blank Corrected (mg/ml)
5	913870	2 ed filter	N/A	3.39	0.45					1.40	
	813868	Probe wash	90		24.0	2.09	17.207	91.8	29.36	6.52	0.000755
	813871	Sample line wash	135		440	59.3				185.12	
	813872	Impinger 1 rinse	185		680	125.66				412.67	
	813873	Impinger 2 rinse	150		44	6.49					
										605.71	
6	813882	2 ed filter	N/A	2.98	1.2					3.69	Very low
	813880	Probe wash	100		<0.1	0	17.136	82.0	29.36		Very low
	813881	Sample line wash	85		11.0	0.935				2.88	Very low
	813883	Impinger 1 rinse	225		330	74.25				275.73	Very low
	813884	Impinger 2 rinse	170		90	15.3					Very low
										282.3	

[a] Data as reported by lab

[b] Blank corrected

[c] Sample spilled at lab

$$\text{ppm } NH_3 = \frac{48.15(\text{mg } NH_3)(T_M + 460)}{(MW_{NH_3})(V_M)(P_M)} \sigma$$

$\sigma = 1.011$

$MW_{NH_3} = 17.032$

T_M = meter temp (°F)

V_M = volume at the meter (ft^3)

P_M = pressure at the meter $PV + \frac{\Delta H}{13.6}$

Run 1 $$\frac{48.15(0.34)(94.9 + 4650)}{(17.032)(16.081)(29.6)} (1.011) = \frac{(16.371)(554.9)}{8107.19} (1.011)$$

$= 1.13$ ppm NH_3 2 ed filter

$$\frac{48.15 \times 5.62 \times 554.9}{8107.19} (1.011) \quad = 18.7 \text{ ppm } NH_3 \text{ probe wash}$$

$$\frac{48.15 \times 1.52 \times 554.9}{8107.19} (1.011) \quad = 5.1 \text{ ppm } NH_3 \text{ SLW}$$

Dup 1 + 2 Not determined due to lost sample

24.93 ppm NH_3 total

Run 2 $$\frac{(48.15)(0.35)(101.8 + 460)}{(17.032)(16.154)(27.6)} (1.011) = \frac{(48.15)(0.35)(561.8)}{8143.99} (1.011)$$

$= 1.15$ ppm NH_3 2 ed filter

Probe wash $= 0$ ppm NH_3

$$\frac{48.15 \times 0.82 \times 561.8}{8143.99} (1.011) \quad = 2.75 \text{ ppm } NH_3 \text{ SLW}$$

$$\frac{48.15 \times 0.95 \times 561.8}{8143.99}(1.011) = 3.19 \text{ ppm } NH_3 \text{ dup } 1 + 2$$

$$\underline{\hphantom{0000}}$$

$$7.09 \text{ ppm } NH_3 \text{ total}$$

Run 3 $$\frac{48.15 \times 0.28 \times (460 + 105.6)}{(17.032)(17.257)(29.55)}(1.011) = \frac{48.15 \times 0.28(565.6)}{8685.37}$$

$$= 0.89 \text{ ppm } NH_3 \text{ 2 ed filter}$$

$$\frac{48.15 \times 0.64 \times 565.6}{8685.37}(1.011) = 2.03 \text{ ppm } NH_3 \text{ SLW}$$

Probe wash $$= 0 \text{ ppm } NH_3$$

$$\frac{48.15 \times 0.08 \times 565.6}{8685.37}(1.011) = 0.25 \text{ ppm } NH_3 \text{ dup } 1 + 2$$

Run 4 $$\frac{48.15 \times 0.63 \times (460 + 94.5)}{(17.032)(17.184)(29.36)}(1.011) = \frac{48.15 \times 0.63 \times 554.5}{8593.02}$$

$$= 1.98 \text{ ppm } NH_3 \text{ 2 ed filter}$$

$$\frac{48.15 \times 9.29 \times 554.5}{8593.02} = 29.18 \text{ ppm } NH_3 \text{ probe wash}$$

$$\frac{48.15 \times 99.51 \times 554.5}{8593.02} = 312.59 \text{ ppm } NH_3 \text{ SLW}$$

$$\frac{48.15 \times 157.4 \times 554.5}{8593.02} = 494.43 \text{ ppm } NH_3 \text{ dup } 1 + 2$$

$$\underline{\hphantom{0000}}$$

$$= 838.18 \text{ ppm } NH_3 \text{ total}$$

Run 5 $$\frac{48.15 \times 0.45 \times (460 + 91.8)}{(17.032)(17.307)(29.36)}(1.011) = \frac{48.15 \times 0.45 \times 551.8}{8604.52}$$

$$= 1.40 \text{ ppm } NH_3 \text{ 2 ed filter}$$

$\frac{(48.15)(2.07)(551.8)}{8604.52}(1.011)$ = 6.52 ppm NH_3 probe wash

$\frac{(48.15)(59.3)(551.8)}{8604.52}(1.011)$ = 1.85.12 ppm NH_3 SLW

$\frac{(48.15)(132.19)(551.8)}{8604.52}(1.011)$ = 412.67 ppm NH_3 dup 1 + 2

605.71 ppm NH_3 total

Run 6 $\frac{(48.15)(1.2)(460 + 82.0)}{(17.032)(17.136)(29.36)}(1.011)$ = $\frac{(48.15)(1.2)(542)}{8569.02}$

= 3.69 ppm NH_3 2 ed filter

Probe wash = 0 ppm NH_3

$\frac{(48.15)(0.935)(542)}{8569.02}(1.011)$ = 2.88 ppm NH_3 SLW

$\frac{(48.15)(89.55)(542)}{8569.02}(1.011)$ = 275.73 ppm NH_3 dup 1 + 2

282.3 ppm NH_3 total

5.7 TOTAL CHROMATOGRAPHABLE (TCO), GRAVIMETRIC ORGANICS, INFRARED SPECTRA (IR), AND GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS) OF TOTAL SAMPLE EXTRACTS

ACUREX Corporation
ANALYSIS LABORATORIES

DATA REPORTING FORM

CUSTOMER Acurex Env. Eng.
DATE
CUSTOMER CONTRACT NO. 307605.72
ACUREX CONTRACT NO. A81-09-007
RESULTS REPORT TO L. Waterland
TELEPHONE
ADDRESS
Mohawk I = 24.99 dscm II = 25.52 dscm

SAMPLE ID (CUSTOMER)	Filter-I	XAD-I	Imp 1-I	Imp 2&3-I	Filter-II	XAD-II	Imp 1-II	Imp 2&3 II		
SAMPLE ID (LAB)	485	488	490	491	493	495	497	498		
PARAMETER										UNITS
TCO-Aliquot	—	2.1, 2.7	—	—	—	1.0, 1.2	—	—		μg
TCO-Blank Aliquot	—	0.11	—	—	—	0.11	—	—		μg
TCO	—	0.09, 0.11	—	—	—	0.038, 0.047	—	—		μg/dscm
GRAV-Aliquot	10	37	—	—	8	12	—	—		mg
GRAV-Blank Aliquot	6	8	—	—	6	8	—	—		mg
GRAV	<0.5	1.3	—	—	<0.5	<0.3	—	—		mg/dscm
Mercury-Aliquot	<0.9	2.5	1.4, 1.3	<0.9	<0.9	4.1	1.1, 1.5	<0.9		μg/l
Mercury-Blank Aliquot	<0.9	3.2	<0.9	<0.9	<0.9	3.2	<0.9	<0.9		μg/l
Mercury	<0.01	<0.8	0.1, 0.1	<0.1	<0.1	<0.8	0.1, 0.2	<0.09		μg/dscm

ANALYST
REVIEWER

Form EED-057 4/80

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ACUREX Corporation
ANALYSIS LABORATORIES

DATA REPORTING FORM

CUSTOMER Acurex Env. Eng.
DATE
CUSTOMER CONTRACT NO. 307605.72
ACUREX CONTRACT NO. A81-09-007
RESULTS REPORT TO L. Waterland
TELEPHONE
ADDRESS
Mohawk I = 24.99 dscm II = 25.52 dscm

SAMPLE ID (CUSTOMER)	XAD-I	XAD-II	XAD Blank	XAD QC						
SAMPLE ID (LAB)	488	495	481	—						
PARAMETER										UNITS
Naphthalene Aliquot	8	15	4	33*						µg
Napthalene	0.2	0.43	—	—						µg/dscm
Phenanthrene Aliquot	<1	3	<1	38*						µg
Phenanthrene	<0.04	0.1	—	—						µg/dscm
Phenol Aliquot	<1	30	<1	—						µg
Phenol	<0.04	1.2	—	—						µg/dscm
Pyrene Aliquot	<1	<1	<1	75*						µg
Other polynuclears Aliquot	<1	<1	<1	—						µg
Other polynuclears	<0.04	<0.04	—	—						µg/dscm

*spiked at 100 µg

ANALYST
REVIEWER

Form EED-057 4/80

IR REPORT

SAMPLE: Mohawk 485 Filter I

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2980	S	C-H Alkane	
1190	M	C-O	
2850	S	C-H Alkane	

IR REPORT

SAMPLE: Mohawk 488 XADI

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2990	S	C-H Alkane	
2830	S	C-H Alkane	

IR REPORT

SAMPLE: Mohawk 493 Filter II

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2850	S	C-H Alkane	

SAMPLE: Mohawk 495 XAD II

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2900	S	C-H Alkane	
2820	S	C-H Alkane	

IR REPORT

SAMPLE: Mohawk 481 XAD Blank

Wave Number (cm^{-1})	Intensity	Assignment	Comments
		No peaks	

SAMPLE: Mohawk 478 Filter blank

Wave Number (cm^{-1})	Intensity	Assignment Comments
		No Peaks

5.8 LIQUID CHROMATOGRAPHY (LC) SEPARATION AND INFRARED SPECTRA OF LC FRACTIONS

ACUREX
Corporation

Energy & Environmental Division

Acurex
MS 2-2260

December 14, 1981
Acurex ID#: A81-11-039
Client P.O.#: 307605.72

ATTENTION: L. Waterland

Sample: Mohawk I XAD extract and blank XAD extract; received 11/24/81.

The above referenced sample were subjected to Level 1 liquid chromatography, gravimetric analysis, and infra-red spectroscopy.

Prepared by: John Labash
John Labash
Staff Chemist

Approved by: Greg Nicoll
Greg Nicoll
Quality Assurance Manager

JL/GN:es

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SAMPLE: Mohawk I XAD #488

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/dscm
Total Sample[1]		31		1.2
Taken for LC[2]		20		0.80
Recovered[3]		8.1		0.32

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/dscm
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1					2.5	<0.5	2.5	3.9		0.16
2					<0.4	<0.4	<0.4	<0.6		<0.02
3					0.8	<0.4	0.8	1.2		0.05
4					1.2	<0.4	1.2	1.9		0.08
5					1.0	<0.4	1.0	1.6		0.06
6					1.6	<0.4	1.6	2.5		0.10
7					3.6	2.6	1.0	1.6		0.06
Sum					10.7	2.6	8.1	12.7		0.51

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample

IR REPORT

SAMPLE: Mohawk Blank XAD 481 F1

Wave Number (cm^{-1})	Intensity	Assignment	Comments
		No Peaks	

IR REPORT

SAMPLE: Mohawk Blank XAD 481 F_2

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2914	S	CH Aliphatic	
2834	S	CH Aliphatic	

SAMPLE: Mohawk Blank XAD 481 F3

Wave Number (cm^{-1})	Intensity	Assignment	Comments
		No Peaks	

IR REPORT

SAMPLE: Mohawk Blank XAD 481 F4

Wave Number (cm^{-1})	Intensity	Assignment	Comments
		No Peaks	

IR REPORT

SAMPLE: Mohawk Blank XAD 481 F5

Wave Number (cm^{-1})	Intensity	Assignment	Comments
		No Peaks	

IR REPORT

SAMPLE: Mohawk Blank XAD 481 F6

Wave Number (cm^{-1})	Intensity	Assignment	Comments
		No Peaks	

IR REPORT

SAMPLE: Mohawk Blank XAD 481 F7

Wave Number (cm⁻¹)	Intensity	Assignment	Comments
2914	S	CH Aliphatic	
2834	M	CH Aliphatic	

IR REPORT

SAMPLE: Mohawk I XAD 488 F1

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2914	S	CH Aliphatic	
2834	M	CH Aliphatic	

IR REPORT

SAMPLE: Mohawk I XAD 488 F2

Wave Number (cm^{-1})	Intensity	Assignment	Comments
		No Peaks	

IR REPORT

SAMPLE: Mohawk I XAD 488 F3

Wave Number (cm^{-1})	Intensity	Assignment	Comments
		No Peaks	

IR REPORT

SAMPLE: Mohawk I XAD 488 F4

Wave Number (cm^{-1})	Intensity	Assignment Comments
		No Peaks

IR REPORT

SAMPLE: Monawk I XAD 488 F5

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2914	S	CH Aliphatic	

IR REPORT

SAMPLE: Mohawk I XAD 488 F6

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3454-3334	S	OH	Broad
2914	S	CH Aliphatic	

IR REPORT

SAMPLE: Mohawk 1 XAD 488 F7

Wave Number $\sim$ (cm^{-1})	Intensity	Assignment	Comments
3414	S	OH (COOH)	Broad
2914	S	CH Aliphatic	
2834	M	CH Aliphatic	
1714	M	C=O (COOH)	
1194	S	CO (COOH)	

5.9 C_1-C_6 HYDROCARBON ANALYSES

Summary of Results of C_1-C_6 Hydrocarbon Analysis

Date	Sample or Cal Time (24-hr)	Sample Bulb ID	Instrument Run No.	Inparafinic Components (ppm)[a]					
				C_1	C_2	C_3	C_4	C_5	C_6
8/11/81	1255	A	8	12.4[b]	ND[c]	[c]	ND	ND	ND
8/11/81	1255	B	10	11.8[b]	ND	2.0	ND	ND	ND
8/11/81	1315	B	9	11.6[b]	ND	4.3	ND	ND	ND
8/11/81	1745	A	12	11.2[b]	ND	3.3	ND	ND	ND
8/11/81	1755	B	13	11.3[b]	ND	2.9	ND	ND	ND
8/11/81	Blank	A	15	12.0[b]	ND	0.4	ND	ND	ND
8/11/81	Blank	B	16	12.1[b]	ND	0.6	ND	ND	ND
8/12/81	1238	A	3	ND	0.4	1.0	ND	ND	ND
8/12/81	1248	B	4	ND	0.4	2.5	ND	ND	ND
8/12/81	1510	A	5	ND	0.4	1.8	ND	ND	ND
8/12/81	1515	B	6	ND	0.5	5.7	0.1	ND	ND
8/12/81	Blank	B	8	ND	ND	0.3	ND	ND	ND
8/12/81	Blank	A	9	ND	ND	[c]	ND	ND	ND
8/13/81	1305	A	13	ND	0.3	5.4	0.2	ND	ND
8/13/81	1540	A	15	ND	0.3	0.2	ND	ND	0.5
8/13/81	1545	B	16	0.3	0.3	3.0	0.1	0.1	0.5
8/13/81	1745	A	17	0.2	0.2	ND[c]	31.1[e]	25.2[e]	17.0[f]
8/13/81	1745	A (repeat)	18	ND	1.1	12.9	5.7[g]	4.0[e]	8.8[h]
8/13/81	1750	B	19	4.1	1.4	4.6	0.3	1.7	7.1[h]
8/13/81	Blank	A	20	ND	ND	10.5	ND	<0.1	ND
8/13/81	Blank	B	21	ND	ND	0.9	ND	ND	ND

[a] ppm values ±0.5 ppm or 10 percent whichever is greater
[b] Blanks indicate high nitrogen response values
[c] ND = Not detected
[d] Detected but no value obtained
[e] 2 components
[f] 3 components
[g] 4 Components
[h] 7 Components

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA, Job No. 307602.70

Injection Date 8-11-81, Time 11:43:37, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 7, Recorder ID HP3390A

Purpose of Run CALIBRATION

Sample Description SCOTT MULTI-COMPONENT MIXTURE C_1-C_6 M-PARAFINS ±10%

GC CONDITIONS

Amount Injected 2.0 ml, Inj. Port or Sample Loop Used 2 ml LOOP

Detector Used: FID X, ECD __, FPD __, TCD __ (Current ____)

Detector Attenuation 4, Amplifier or Range X 10^{-11}

Column: Liquid Phase ____, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ____, Material SS

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

SAMPLE RUN

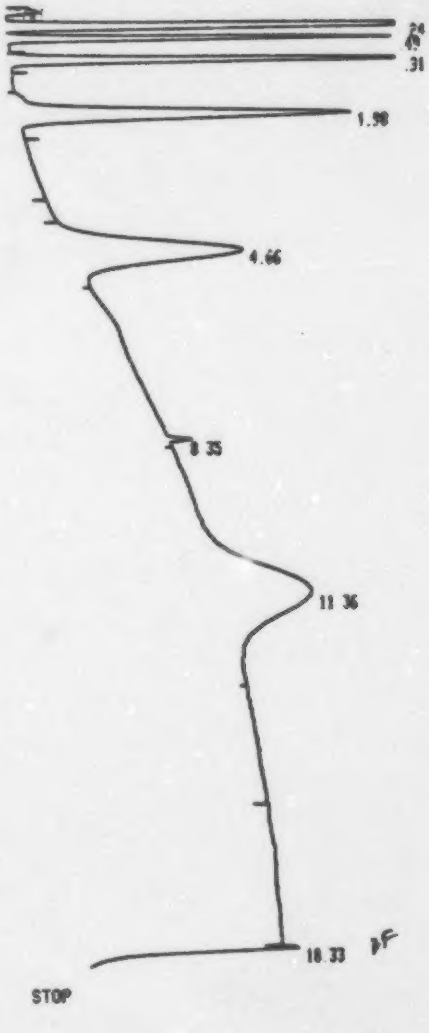
Sampling Method PURGE 2.0 ml LOOP

RT	Area	Peak Height	Amount (ppm)	Component
.24	89499		17.0	$C_1 + N_2$
.49	40681		10.3	C_2
.91	62357		10.6	C_3
1.98	90704		10.8	C_4
4.66	110740		10.4	C_5
11.36	209710		10.1	C_6

Name of Operator M.D. Chips, Date OCT 30 1981

c₁-c₆ cal

Operator. M.D. CHIPS. Date. 8-11-81
Column No. Length. 6' Dia. 1/8"
Coating. Concn. Mesh. 60/80
Support. PORAPAK Q
TEMP: Col: Init. 120 °C Final. 120 °C
Rate. °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS. He Rate. 60 psi ~~ml/min.~~
Pressures: Inlet. Outlet.
Hydrogen. 40 psi ~~ml/min.~~ Air. 60 psi ~~ml/min.~~
DETECTOR E.C. T.C. F.I.D. 4 × 10⁻¹¹
Scavenger. Rate. ml/min.
Sens. Rec. Range. mv.
SAMPLE. CALIBRATION Size. 2.0 mL
Solvent. Concn.



```
RUN #    7            AUG/11/81  11:43:37

ESTD
  RT          AREA TYPE  CAL#         AMOUNT
  0.24       89499 D PP    1R         17.046
  0.49       40681 D PB    2R         10.205
  0.91       62357   BB    3R         10.596
  1.98       90704   PB    4R         10.712
  4.66      110740   BV    5R         10.902
 11.36      209710   VB    6R          5.463

TOTAL AREA=     603690
MUL FACTOR= 1.0000E+00
```

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA, Job No. 307602.70

Injection Date 8-11-81, Time 15:07:27, Instrument ID VARIAN 3700
Recorder/Printout Reference No. 11, Recorder ID HP3390A
Purpose of Run CALIBRATION

Sample Description SCOTT MULTI-COMPONENT MIXTURE
C_1-C_6 N-PARAFINS ±10%

GC CONDITIONS

Amount Injected 2.0 ml, Inj. Port or Sample Loop Used 2 ml LOOP
Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current _______)
Detector Attenuation 4, Amplifier or Range $\times 10^{-11}$
Column: Liquid Phase _______, Solid Phase PORAPAK Q,
Length 6', O.D. 1/8", I.D. _______, Material S.S.
Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C
Temperature Program ISOTHERMAL

SAMPLE RUN

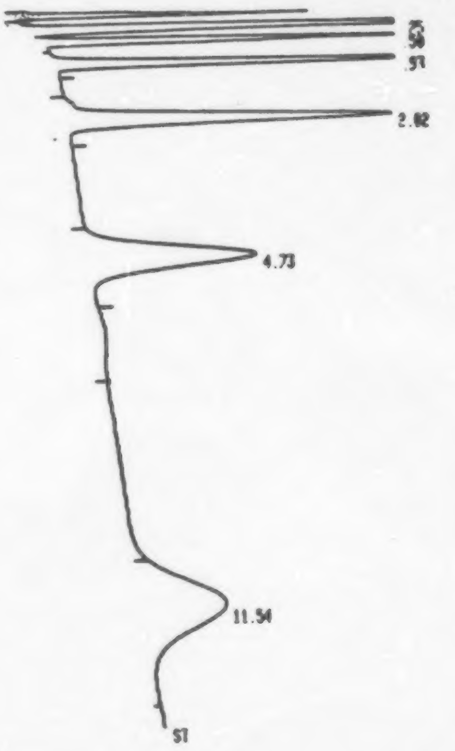
Sampling Method PURGE 2.0 ml LOOP

RT	Area	Peak Height	Amount (ppm)	Component
.25	95314		17.0	$C_1 + N_2$
.50	43441		10.3	C_2
.93	65473		10.6	C_3
2.02	90164		10.8	C_4
4.73	102940		10.4	C_5
11.54	110840		10.1	C_6

Name of Operator M.D. Chips, Date OCT 30 1981

Operator M. D. CHIPS Date 8-11-81
Column No. ...... Length 6' Dia. 1/8"
Coating ...... Concn. ...... Mesh 60/80
Support PORAPAK Q
TEMP: Col: Init. 120 °C Final 120 °C
Rate ...... °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS He Rate 60psi ~~ml./min.~~
Pressures: Inlet ...... Outlet ......
Hydrogen 40psi ml./min. Air 60psi ~~ml./min.~~
DETECTOR E.C. ...... T.C. ...... F.I.D. 4 x 10-11
Scavenger ...... Rate ...... ml./min.
Sens. ...... Rec.Range ...... mv.
SAMPLE CALIBRATION Size 2.0 ML
Solvent ...... Concn. ......

C1-C5 cal gas



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RUN #   11             AUG/11/81  15:07:27

ESTD
  RT        AREA TYPE  CAL#         AMOUNT
  0.25     95314 D PV                0.000
  0.50     43441 D VV    2R         10.898
  0.93     65473   VB    3R         11.115
  2.02     90164   BB    4R         10.648
  4.73    102940   PB    5R         10.209
 11.54    110840   BP    6           5.338

TOTAL AREA=     508180
MUL FACTOR= 1.0000E+00
```

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA, Job No. 307602.70

Injection Date 8-11-81, Time 19:17:08, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 14, Recorder ID HP3390A

Purpose of Run CALIBRATION

Sample Description SCOTT MULTI-COMPONENT MIXTURE C_1-C_6 N-PARAFINS ±10%

GC CONDITIONS

Amount Injected 2.0ml, Inj. Port or Sample Loop Used 2ml LOOP

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ______)

Detector Attenuation 4, Amplifier or Range $\times 10^{-11}$

Column: Liquid Phase ______, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ______, Material SS

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

SAMPLE RUN

Sampling Method PURGE 2.0ml LOOP

RT	Area	Peak Height	Amount (ppm)	Component
.25	94602		17.0	$C_1 + N_2$
.50	39327		10.3	C_2
.93	59992		10.6	C_3
2.03	87652		10.8	C_4
4.75	99999		10.4	C_5
11.57	118730		10.1	C_6

Name of Operator M.D. CHIPS, Date OCT 30 1981

Operator M.D. CHIPS Date 8-11-81
Column No. Length 6' Dia. 1/8"
Coating Concn.
Support PORAPAK Q Mesh 60/80
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS He Rate 60 psi ~~ml./min.~~
Pressures: Inlet Outlet
Hydrogen 40 psi ml./min. Air 60 psi ~~ml./min.~~
DETECTOR E.C. T.C. F.I.D. 4 x 10⁻¹¹
Scavenger Rate ml./min.
Sens. Rec.Range mv.
SAMPLE CALIBRATION Size 2.0 mL
Solvent Concn.

C₁-C₆ std

```
LIST: ZERO =  0, 0.0
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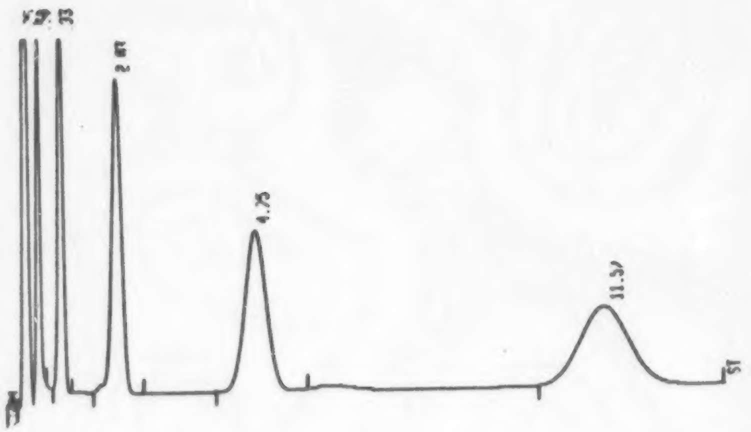

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RUN #   14                AUG/11/81  19:17:00
ESTD
  RT        AREA TYPE  CAL#         AMOUNT
   0.25    94602 D PP    1          16.973
   0.50    39327 D PB   2R           9.866
   0.93    59992   BB   3R          10.184
   2.03    87652   PB   4R          10.352
   4.75    99999   PB   5R           9.917
  11.57   118730   BB    6          10.919

TOTAL AREA=     500300
MUL FACTOR= 1.0000E+00
```

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA, Job No. 307602.70

Injection Date 8-12-81, Time 11:25:52, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 2, Recorder ID HP3390A

Purpose of Run CALIBRATION

Sample Description SCOTT MULTI-COMPONENT MIXTURE C_1-C_6 n-PARAFINS ±10%

GC CONDITIONS

Amount Injected 2.0ml, Inj. Port or Sample Loop Used 2ml LOOP

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ______)

Detector Attenuation 4, Amplifier or Range $\times 10^{-11}$

Column: Liquid Phase ______, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ______, Material SS

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

SAMPLE RUN

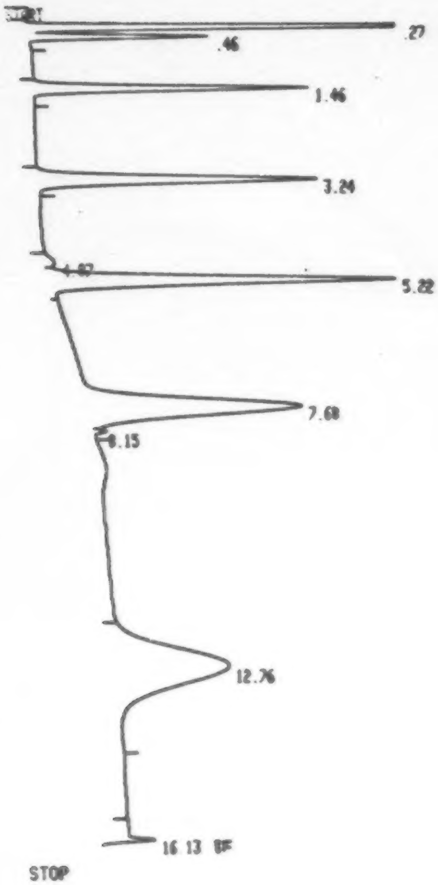
Sampling Method PURGE 2.0ml LOOP

RT	Area	Peak Height	Amount (ppm)	Component
.46	20373		17.0	C_1
1.46	41577		10.3	C_2
3.24	60733		10.6	C_3
5.22	85688		10.8	C_4
7.68	110660		10.4	C_5
12.76	123820		10.1	C_6
.27	59160		—	N_2

Name of Operator M.D. CHIPS, Date OCT 30 1981

5-96

$C_1 - C_6$ cal
TP 60 → 160°C
20°C/min



Operator M.D. CHIPS Date 8-12-81
Column No. Length 6' Dia. 1/8"
Coating Concn.
Support PORAPAK Q Mesh 80/80
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS He Rate 60 psi ~~ml/min.~~
Pressures: Inlet Outlet
Hydrogen 40 psi ~~ml/min~~ Air 60 psi ~~ml/min.~~
DETECTOR E.C. T.C. F.I.D. 4 X 10⁻¹¹
Scavenger Rate ml/min.
Sens. Rec.Range mv.
SAMPLE CALIBRATION Size 2.0 ML
Solvent Concn.

```
RUN #    2                AUG/12/81  11:25:52

AREA%
  RT          AREA TYPE    AR/HT      AREA%
  0.27       53160 D PV    0.004     11.181
  0.46       20373 D VB    0.006      3.850
  1.46       41577   BB    0.115      7.850
  3.24       60733   PB    0.166     11.470
  4.87        1001   PV    0.119      0.189
  5.22       85680   VP    0.190     16.194
  7.60      110660   PV    0.394     20.914
  8.15        1274 D VB    0.074      0.241
 12.76      123820   BB    0.837     23.400
 16.13       24845 I BP    0.361      4.696

TOTAL AREA=     529130
MUL FACTOR= 1.0000E+00
```

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK, Job No. 307602.70
BAKERSFIELD, CA

Injection Date 8-12-81, Time 16:43:53, Instrument ID VARIAN 3700
Recorder/Printout Reference No. 7, Recorder ID HP3390A
Purpose of Run CALIBRATION

Sample Description SCOTT MULTI-COMPONENT MIXTURE
C_1-C_6 n-PARAFINS ±10%

GC CONDITIONS

Amount Injected 2.0ml, Inj. Port or Sample Loop Used 2ml LOOP
Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ______)
Detector Attenuation 4, Amplifier or Range $\times 10^{-11}$
Column: Liquid Phase ______, Solid Phase PORAPAK Q,
Length 6', O.D. 1/8", I.D. ______, Material S.S.
Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C
Temperature Program ISOTHERMAL

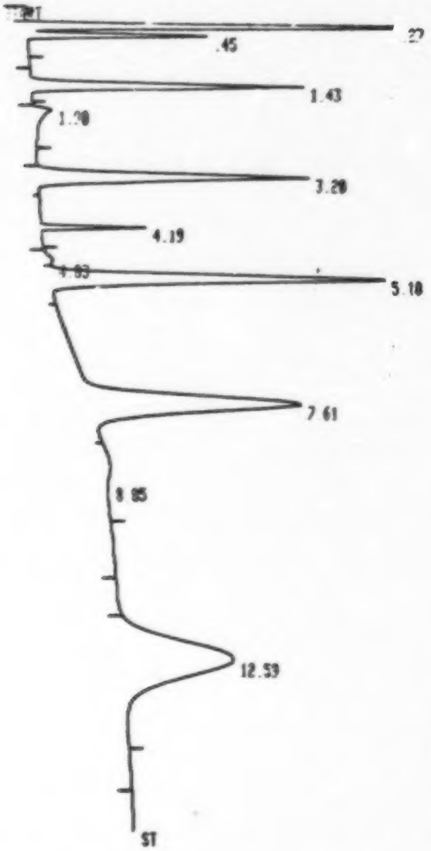
SAMPLE RUN

Sampling Method PURGE 2.0ml LOOP

RT	Area	Peak Height	Amount (ppm)	Component
.45	20206		17.0	C_1
1.43	40794		10.3	C_2
1.90	5447		10.6	C_3
3.20	59377		10.8	C_4
5.18	83930		10.4	C_5
7.61	121220		10.1	C_6
12.27 .27	53415		–	N_2

Name of Operator M.D. Chips, Date OCT 30 1981

C_1–C_6 Cal
TP 60→160 °C
20°C/min



Operator M.D. CHIPS Date 8-12-81
Column No. Length 6' Dia. 1/8"
Coating Concn.
Support PORAPAK Q Mesh 60/80
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS N_2 Rate 60 PSI ~~ml/min.~~
Pressures: Inlet Outlet
Hydrogen 40 PSI ml./min. Air 60 PSI ~~ml/min.~~
DETECTOR E.C. T.C. F.I.D. 4 X 10^{-11}
Scavenger Rate ml./min.
Sens. Rec. Range mv.
SAMPLE CALIBRATION Size 2.0 ML
Solvent Concn.

```
RUN #    7                    AUG/12/81  16:43:53

AREA%
  RT            AREA TYPE   AR/HT       AREA%
  0.27         53415 D BV   0.083      10.031
  0.45         20206 D VB   0.085       3.795
  1.43         40794   BB   0.114       7.661
  1.90          5447   PB   0.233       1.023
  3.20         59397   PP   0.167      11.155
  4.19          8372 D PB   0.061       1.572
  4.83          1211   PV   0.146       0.227
  5.18         83930   VP   0.190      15.762
  7.61        121220   PV   0.422      22.765
  8.85         17007   VB   1.038       3.194
 12.59        121490   BB   0.832      22.815

TOTAL AREA=     532490
MUL FACTOR= 1.0000E+00
```

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA, Job No. 307602.70

Injection Date ______, Time ______, Instrument ID VARIAN 3700

Recorder/Printout Reference No. ______, Recorder ID HP3390A

Purpose of Run CALIBRATION

Sample Description SCOTT MULTI-COMPONENT MIXTURE C_1-C_6 n-PARAFINS ±10%

GC CONDITIONS

Amount Injected 2.0 ml, Inj. Port or Sample Loop Used 2 ml LOOP

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ______)

Detector Attenuation 4, Amplifier or Range $\times 10^{-11}$

Column: Liquid Phase ______, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ______, Material SS

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

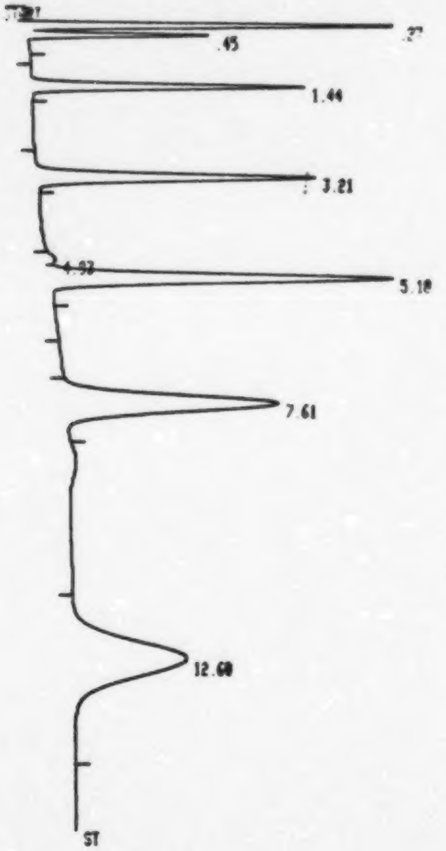
SAMPLE RUN

Sampling Method PURGE 2.0 ml LOOP

RT	Area	Peak Height	Amount (ppm)	Component
.45	20286		17.0	C_1
1.44	41701		10.3	C_2
3.21	61024		10.6	C_3
5.18	88067		10.8	C_4
7.61	103150		10.4	C_5
[illegible]60	124100		10.1	C_6
.27	52886		—	N_2

Name of Operator M.D. CHIPS, Date OCT 30 1981

C_1-C_6 cal
TP 60 → 160°C 20°C/min



Operator M.D. CHiPS Date 8-13-81
Column No. Length 6' Dia 1/8"
Coating Concn.
Support PORAPAK Q Mesh 60/80
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det 250 °C Inj. 120 °C
CARRIER GAS He Rate 60 psi ~~ml/min.~~
Pressures: Inlet Outlet
Hydrogen 40 psi ~~ml/min.~~ Air 600 psi ~~ml/min.~~
DETECTOR E.C. T.C. F.I.D. 4 x 10^{-11}
Scavenger Rate ml/min.
Sens. Rec. Range mv.
SAMPLE CALIBRATION Size 2.0 ML
Solvent Concn.

```
RUN #   12              AUG/13/81  13:46:24

AREA%
  RT          AREA TYPE    AR/HT       APEA%
  0.27        52886 D BV   0.083      10.724
  0.45        20289 D VB   0.084       4.114
  1.44        41701   BB   0.116       8.456
  3.21        61024   PB   0.167      12.374
  4.83         1930   BV   0.179       0 391
  5.18        88067   VB   0.195      17.850
  7.61       103150   BB   0.369      20.917
 12.60       124100   BB   0.834      25.165

TOTAL AREA=     493150
MUL FACTOR= 1.0000E+00
```

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA, Job No. 307602.70

Injection Date 8-13-81, Time 20:28:24, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 22, Recorder ID HP3390A

Purpose of Run CALIBRATION

Sample Description SCOTT MULTI-COMPONENT MIXTURE C_1-C_6 n-PARAFINS ±10%

GC CONDITIONS

Amount Injected 2.0 ml, Inj. Port or Sample Loop Used 2 ml LOOP

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ________)

Detector Attenuation 4, Amplifier or Range X 10^{-11}

Column: Liquid Phase ________, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ________, Material SS

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

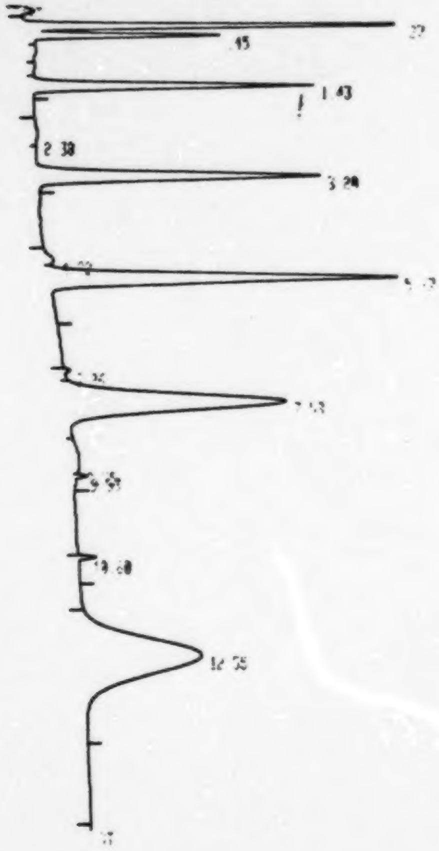
SAMPLE RUN

Sampling Method PURGE 2.0 ml LOOP

RT	Area	Peak Height	Amount (ppm)	Component
.45	22948		17.0	C_1
1.43	43279 1061		10.3	C_2
7.38	61645		10.6	C_3
3.20 4.82	1809 90888		10.8	C_4
5.17	668		10.4	C_5
6.96	107570		10.1	C_6
7.58 .27 12.55	49780 128680		–	N_2

Name of Operator M.D. CHIPS, Date OCT 30 1981

C_1-C_6 cal



Operator. M.D. GRIPS ... Date. 8-13-81
Column No. ... Length. 6' ... Dia. 1/8"
Coating ... Concn.
Support. PORAPAK Q ... Mesh. 60/80
TEMP: Col: Init. 120 °C Final. 120 °C
Rate ... °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS. He ... Rate. 60 PSI ~~ml/min.~~
Pressures: Inlet ... Outlet
Hydrogen. 40 PSI ~~ml/min.~~ Air. 60 PSI ~~ml/min.~~
DETECTOR E.C. ... T.C. ... F.I.D. 4×10^{-11}
Scavenger ... Rate ... ml/min.
Sens. ... Rec.Range ... mv.
SAMPLE. CALIBRATION ... Size. 2.0 mL
Solvent ... Concn.

22 8-13-81 20:28:24

```
RUN #   22                  [illegible]     [illegible]

AREA%
   RT         AREA TYPE    AR/HT          AREA%
  0.27       49790 0 PV    [illegible]    [illegible]
  0.45       22048 0 VV    [illegible]    4.470
  1.43       43279   VB    [illegible]    [illegible]
  2.38        1061   PP    [illegible]    [illegible]
  3.20       61645   PB    [illegible]    [illegible]
  4.82        1367   PV    [illegible]    [illegible]
  5.17       46688   VB    0.192          [illegible]
  [illegible]  268 0 BV    [illegible]    [illegible]
  7.53      147570   VV    [illegible]    [illegible]
  8.75        5873   VV    [illegible]    [illegible]
  9.87        1290 0 VB    [illegible]    [illegible]
 10.60        1446 0 BP    [illegible]    [illegible]
 12.55      128688   BP    [illegible]    [illegible]
```

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GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA, Job No. 30760270

Injection Date 8-11-81, Time 13:46:41, Instrument ID VARIAN 3700
Recorder/Printout Reference No. 8, Recorder ID HP3390A
Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description 1255 BULB-A

GC CONDITIONS

Amount Injected 2 ml, Inj. Port or Sample Loop Used 2.0ML LOOP
Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ______)
Detector Attenuation 4, Amplifier or Range 10^{-11}
Column: Liquid Phase N/A, Solid Phase PORAPAK Q,
Length 6', O.D. 1/8", I.D. ______, Material S.S.
Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C
Temperature Program ISOTHERMAL

SAMPLE RUN

Sampling Method GRAB 500ML STAINLESS STEEL BULB

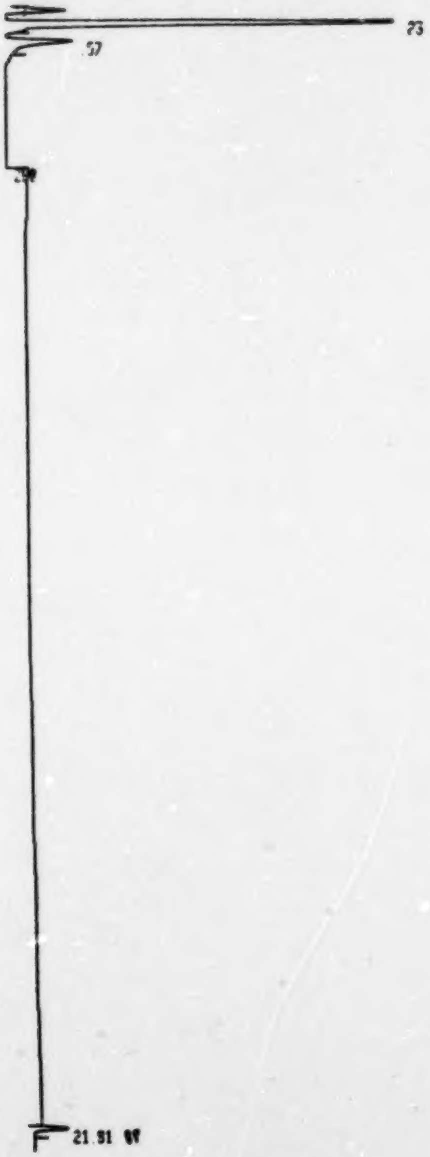
RT	Area	Peak Height	Amount (PPM)	Component
.23	67564		12.4	$C_1 + N_2$
.57			—	

Name of Operator M.D. CHIPS, Date OCT 30 1981

Sample A
taken 1255 [illegible]°C
and [illegible]°C

12" in N PorT

Operator M.D. Gaines .... Date 8-11-81
Column No. .... Length 6' .... Dia. 1/8"
Coating .... Concn. ....
Support PORAPAK Q .... Mesh 60/80 ....
TEMP: Col: Init. 120 °C Final 120 °C
Rate .... °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS He .... Rate 60 PSI .... ~~ml/min.~~
Pressures: Inlet .... Outlet ....
Hydrogen 40 PSI ~~ml/min.~~ Air 60 PSI ~~ml/min.~~
DETECTOR E.C. .... T.C. .... F.I.D. 4x10^-11
Scavenger .... Rate .... ml/min.
Sens. .... Rec.Range .... mv.
SAMPLE 1255 Bulb A .... Size 2 mL
Solvent .... Concn. ....



```
STOP



RUN #    8             AUG/11/81  13:46:41

ESTD
  RT          AREA TYPE  CAL#         AMOUNT
  0.23       67564 D PB    1R         12.860
```

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA, Job No. 30760270

Injection Date 8-11-81, Time 14-18:24, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 9, Recorder ID HP3390A

Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description 1315 BULB-B

GC CONDITIONS

Amount Injected 2. ml, Inj. Port or Sample Loop Used 2.0ML LOOP

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ________)

Detector Attenuation 4, Amplifier or Range 10^{-11}

Column: Liquid Phase N/A, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ________, Material S.S.

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

SAMPLE RUN

Sampling Method GRAB 500ML STAINLESS STEEL BULB

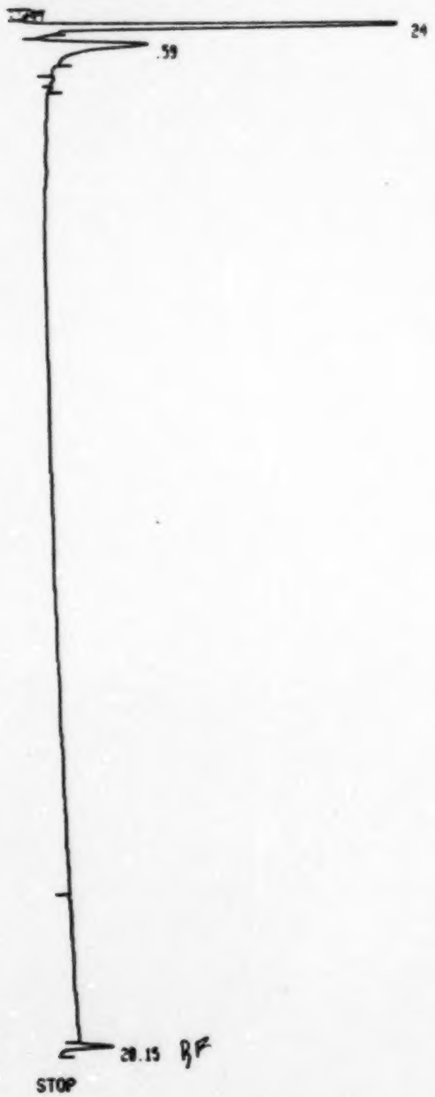
RT	Area	Peak Height	Amount (PPM)	Component
.24	63089		11.6	$C_1 + N_2$
.59	26205		4.3	C_3
20.15	13427 (BACK FLUSH)	—	2.4	→ as CH_4

Name of Operator M.D. CHIPS, Date OCT 30 1981

Sample 8 taken 1315 200°C and 100°C
12" in N pot

Operator M.D. SHIPS Date 8-11-81
Column No. Length 6' Dia. 1/8
Coating Concn.
Support PORAPAK Q Mesh 60/80
TEMP: Col: Init. °C Final °C
Rate °C/min. Det. °C Inj. °C
CARRIER GAS Rate ml./min.
Pressures: Inlet Outlet
Hydrogen ml./min. Air ml./min.
DETECTOR E.C. T.C. F.I.D. 4 X 10^{-11}
Scavenger Rate ml./min.
Sens. Rec. Range mv.
SAMPLE 13.15 BULB-B Size 2.0 mL
Solvent Concn.

```
LIST: ZERO =  0, 0.0
```



```
STOP


RUN #    9             AUG/11/81  14:10:24

ESTD
   RT          AREA TYPE  CAL#        AMOUNT
  0.24        63089 D PB    1R        12.016

TOTAL AREA=      63089
MUL FACTOR= 1.0000E+00
```

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA, Job No. 30760270

Injection Date 8-11-81, Time 14:51:31, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 10, Recorder ID HP3390A

Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description 1255 BULB-A

GC CONDITIONS

Amount Injected 2. ml, Inj. Port or Sample Loop Used 2.0ML LOOP

Detector Used: FID X, ECD __, FPD __, TCD __ (Current ____)

Detector Attenuation 4, Amplifier or Range 10^{-11}

Column: Liquid Phase N/A, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ____, Material S.S.

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

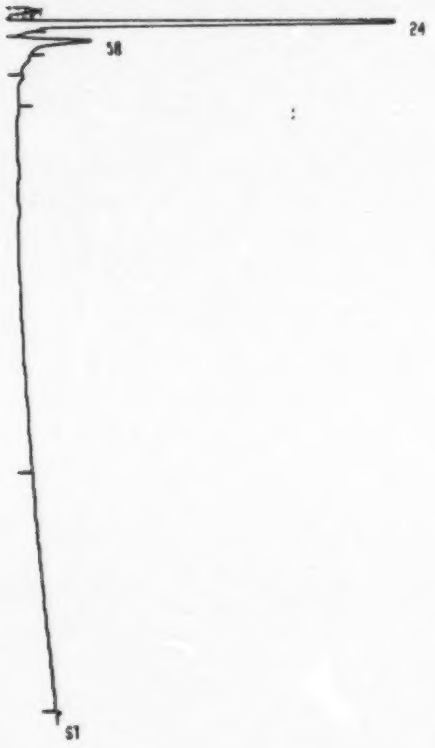
SAMPLE RUN

Sampling Method GRAB 500ML STAINLESS STEEL BULB

RT	Area	Peak Height	Amount (PPM)	Component
.24	64166		11.8	$C_1 + N_2$
.58	12088		2.0	C_3

Name of Operator M.D. CHIPS, Date OCT 30 1981

Sample A Repeat (Teflon 1255)
12" in N Port



```
RUN #   10              AUG/11/81  14:51:31

ESTD
  RT         AREA TYPE  CAL#         AMOUNT
  0.24      64166 D PB    1R         12.221
  0.58      12088   PB                0.000

TOTAL AREA=      76254
MUL FACTOR= 1.0000E+00
```

Operator M. D. CHIPS Date 8-11-81
Column No. Length 6' Dia. 1/8"
Coating Concn.
Support PORAPAK Q Mesh 60/80
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS He Rate 60 PSI ~~ml/min.~~
Pressures: Inlet Outlet
Hydrogen 40 PSI ~~ml/min.~~ Air 60 PSI ~~ml/min.~~
DETECTOR E.C. T.C. F.I.D. 4×10^{-11}
Scavenger Rate ml/min.
Sens. Rec.Range mv.
SAMPLE 1255 BULB-A Size 2.0 ML
Solvent Concn.

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA, Job No. 30760370

Injection Date 8-11-81, Time 18:45:10, Instrument ID VARIAN 3700
Recorder/Printout Reference No. 12, Recorder ID HP3390A
Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description 1745 BULB-A

GC CONDITIONS

Amount Injected 2.0ml, Inj. Port or Sample Loop Used 2.0ML LOOP
Detector Used: FID X, ECD __, FPD __, TCD __ (Current ____)
Detector Attenuation 4, Amplifier or Range 10^{-11}
Column: Liquid Phase N/A, Solid Phase PORAPAK Q,
Length 6', O.D. 1/8", I.D. ____, Material S.S.
Temperature: Injector 120 °C, Oven 130 °C, Detector 250 °C
Temperature Program ISOTHERMAL

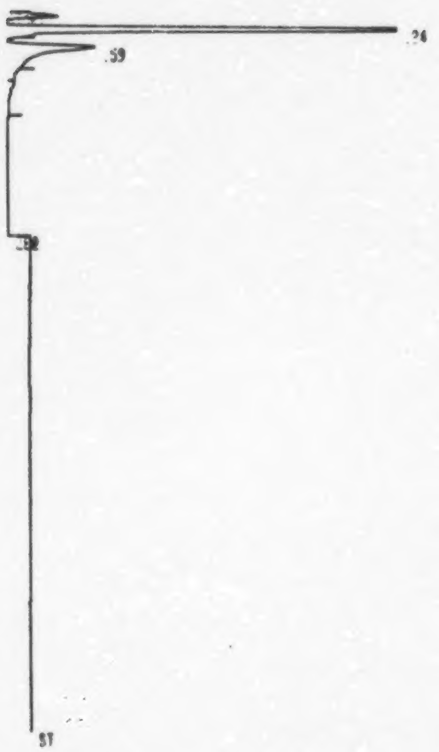
SAMPLE RUN

Sampling Method GRAB 500ml STAINLESS STEEL BULB

RT	Area	Peak Height	Amount (PPM)	Component
.24	63050		11.2	$C_1 + N_2$
.59	20114		3.3	C_3

Name of Operator M.D. CHIPS, Date OCT 30 1981

sample A taken 1745
12" in N Port



```
RUN #   12            AUG/11/81  18:45:10

ESTD
   RT          AREA TYPE  CAL#        AMOUNT
  0.24        63050 D PB    1         11.246
  0.59        20114   PB               0.000

TOTAL AREA=       83164
MUL FACTOR= 1.0000E+00
```

Operator M.D. CHIPS Date 8-11-81
Column No. Length 6 Dia. 1/8"
Coating Concn.
Support PORAPAK Q Mesh 60/80
TEMP: Col: Init 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS He Rate 60 PSI ~~ml./min.~~
Pressures: Inlet Outlet
Hydrogen 40 PSI ~~ml./min.~~ Air 60 PSI ~~ml./min.~~
DETECTOR E.C. T.C. F.I.D. 4×10⁻¹¹
Scavenger Rate ml./min.
Sens. Rec.Range mv.
SAMPLE 1745 BULB-A Size 2.0ML
Solvent Concn.

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA, Job No. 307602.70

Injection Date 8-11-81, Time 19:01:25, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 13, Recorder ID HP3390A

Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description 1755 BULB-B

GC CONDITIONS

Amount Injected 2.0ml, Inj. Port or Sample Loop Used 2.0ML LOOP

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ______)

Detector Attenuation 4, Amplifier or Range 10^{-11}

Column: Liquid Phase N/A, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ______, Material S.S.

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

SAMPLE RUN

Sampling Method GRAB 500ML STAINLESS STEEL BULB

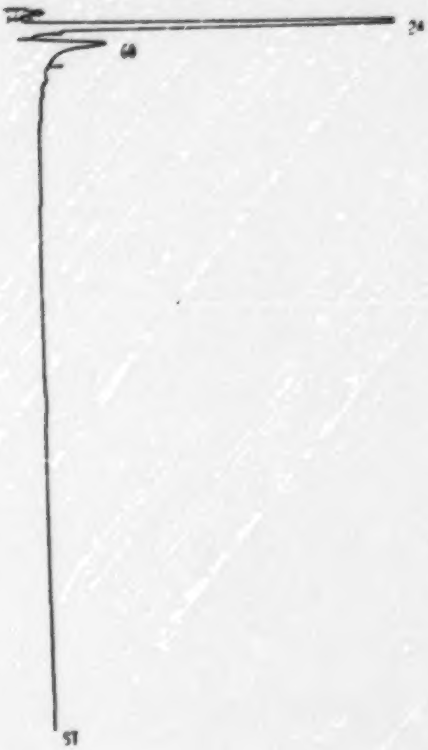
RT	Area	Peak Height	Amount (PPM)	Component
.24	63380		11.3	C_1+N_2
.60	17588		2.9	C_3

Name of Operator M.D. CHIPS, Date OCT 30 1981

5-112

sample B taken 1755
10" in N port

```
LIST: ZERO =  0, 0.0
```



```
RUN #   13              AUG/11/81  19:01:25

ESTD
  RT          AREA TYPE  CAL#        AMOUNT
 0.24        63300 D PB    1         11.304
 0.60        17588   PB               0.000

TOTAL AREA=       80968
MUL FACTOR= 1.0000E+00
```

Operator M. D. Chips Date 8-11-81
Column No. Length 6' Dia. 1/8
Coating Concn. Mesh 60/80
Support Porapak Q
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS He Rate 60 psi ~~ml/min.~~
Pressures: Inlet Outlet
Hydrogen 40 psi ~~ml/min.~~ Air 60 psi ~~ml/min.~~
DETECTOR E.C. T.C. F.I.D. 4×10^{-11}
Scavenger Rate ml/min.
Sens. Rec. Range mv.
SAMPLE 1755 BULB-B Size 2.0 mL
Solvent Concn.

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA, Job No. 30760270

Injection Date 8-11-81, Time 19:58:28, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 15, Recorder ID HP3390A

Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description BLANK BULB-A

GC CONDITIONS

Amount Injected ______, Inj. Port or Sample Loop Used 2.0ML LOOP

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ______)

Detector Attenuation 4, Amplifier or Range 10^{-11}

Column: Liquid Phase N/A, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ______, Material S.S.

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

SAMPLE RUN

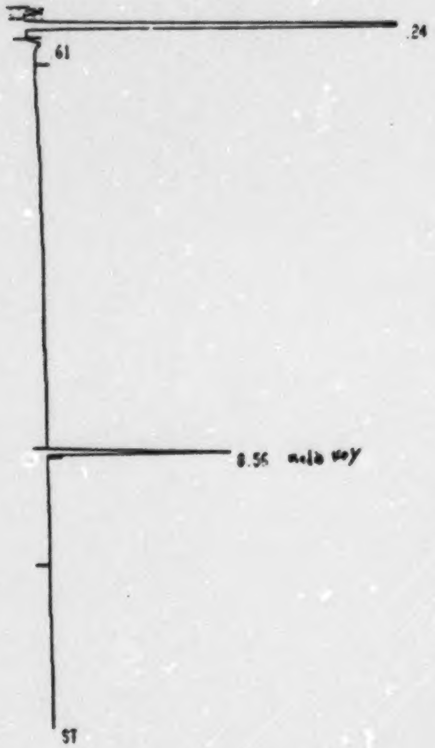
Sampling Method PURGE WITH N_2

RT	Area	Peak Height	Amount (PPM)	Component
.24	67396		12.0	$C_1 + N_2$
.61	2205		0.4	C_3
8.56	RADIO INTERFERENCE			

Name of Operator M.D. CHIPS, Date OCT 30 1981

5-114

Blank Bulb A
N_2 1-9C



```
RUN #   15             AUG/11/81  19:38:28

ESTD
  RT          AREA TYPE  CAL#         AMOUNT
  0.24       67396 D PB    1          '2.021
  0.61        2205   PB                0.000
  8.56       14241 D PB                0.000

TOTAL AREA=      83842
MUL FACTOR= 1.0000E+00
```

Operator M. D. Phillips Date 8-11-81
Column No. Length 6' Dia. 1/8"
Coating Concn.
Support PORAPAK Q Mesh 60/80
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS He Rate 60 psi ~~ml/min.~~
Pressures: Inlet Outlet
Hydrogen 40 psi ~~ml/min.~~ Air 60 psi ~~ml/min.~~
DETECTOR E.C. T.C. F.I.D. 4 X10-11
Scavenger Rate ml/min.
Sens. Rec.Range mv.
SAMPLE BLANK Bulb-A Size 2.0 ml
Solvent Concn.

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA, Job No. 30760270

Injection Date 8-11-81, Time 19:53:56, Instrument ID VARIAN 3700
Recorder/Printout Reference No. 16, Recorder ID HP3390A
Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description BLANK BULB-B

GC CONDITIONS

Amount Injected 2.0ML, Inj. Port or Sample Loop Used 2.0ML LOOP
Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ______)
Detector Attenuation 4, Amplifier or Range 10^{-11}
Column: Liquid Phase N/A, Solid Phase PORAPAK Q,
Length 6', O.D. 1/8", I.D. ______, Material S.S.
Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C
Temperature Program ISOTHERMAL

SAMPLE RUN

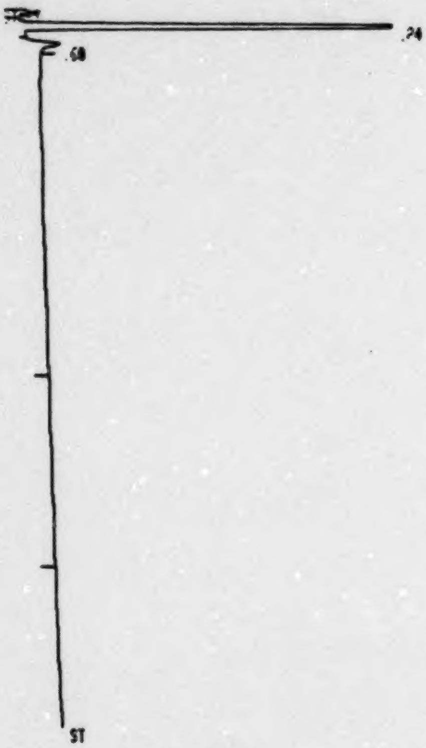
Sampling Method PURGE WITH N_2

RT	Area	Peak Height	Amount (PPM)	Component
.24	68087		12.1	C_1+N_2
.60	3521		0.6	C_3

Name of Operator M.D. CHIPS, Date OCT 30 1981

5-116

Blank Bulb B
N_2 purge



Operator M.D. CHIPS Date 8-11-81
Column No. Length 6' Dia. 1/8"
Coating Concn.
Support PORAPAK Q Mesh 60/80
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS H_e Rate 60 psi ~~ml/min.~~
Pressures: Inlet Outlet
Hydrogen 40 psi ~~ml/min.~~ Air 60 psi ~~ml/min.~~
DETECTOR E.C. T.C. F.I.D. 4 × 10^{-11}
Scavenger Rate ml/min.
Sens. Rec.Range mv.
SAMPLE BLANK BULB-B Size 2.0 ml
Solvent Concn.

```
RUN #   16              AUG/11/81  19:53:56

ESTD
  RT          AREA TYPE  CAL#        AMOUNT
 0.24        68087 D PP    1         12.144
 0.60         3521   PB               0.900

TOTAL AREA=      71600
MUL FACTOR= 1.0000E+00
```

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA, Job No. 30760270

Injection Date 8-12-81, Time 13:13:46, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 3, Recorder ID HP3390A

Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description 1238 BULB A

GC CONDITIONS

Amount Injected 2.0ml, Inj. Port or Sample Loop Used 2.0ML LOOP

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ________)

Detector Attenuation 4, Amplifier or Range 10^{-11}

Column: Liquid Phase N/A, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ________, Material S.S.

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

SAMPLE RUN

Sampling Method GRAB 500ML STAINLESS STEEL BULB

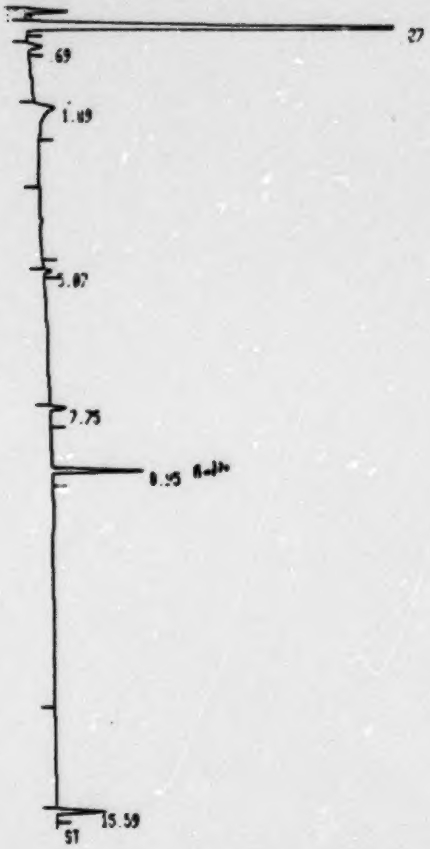
RT	Area	Peak Height	Amount (PPM)	Component
.27	53754		—	N_2
.69	1644		0.4	C_2
1.89	5586		1.0	C_3
5.07	RADIO INTERFERENCE			
7.75				
8.95				
15.59				

Name of Operator M.D. CHIPS, Date OCT 30 1981

Sample A 12" in E Port
Taken 1238

```
STOP  TIME  1  6 0

11:42:53
```



```
RUN #    3                AUG/12/81  13:13:46

AREA%
  RT            AREA TYPE   AR/HT        AREA%
  0.27         53754 D BB   0.080       72.950
  0.69          1644 D PB   0.08A        2.231
  1.89          5586   PB   0.222        7.581
  5.07           564 D BB   0.064        0.765
  7.75          1351 D BB   0.962        1.934
  8.95          6994 D BB   0.058        9.492
 15.59          3793 D BB   0.062        5.148

TOTAL AREA=      73686
MUL FACTOR= 1.0000E+00
```

Operator M. D. Gaines Date 8-12-81
Column No. Length 6' Dia. 1/8"
Coating Concn.
Support Porapak Q Mesh 80/100
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det 250 °C Inj. 120 °C
CARRIER GAS He Rate 60 psi ~~ml/min.~~
Pressures: Inlet Outlet
Hydrogen 40 psi ~~ml/min.~~ Air 60 psi ~~ml/min.~~
DETECTOR E.C. T.C. F.I.D. 4 x 10⁻¹¹
Scavenger Rate ml/min.
Sens. Rec. Range mv.
SAMPLE 1238 Bulb-A Size 2.0 ML
Solvent Concn.

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA, Job No. 30760270

Injection Date 8-12-81, Time 13:45:07, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 4, Recorder ID HP3390A

Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description 1248 BULB-B

GC CONDITIONS

Amount Injected 2.0ml, Inj. Port or Sample Loop Used 2.0ML LOOP

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ________)

Detector Attenuation 4, Amplifier or Range 10^{-11}

Column: Liquid Phase N/A, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ________, Material S.S.

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

SAMPLE RUN

Sampling Method GRAB 500ml STAINLESS STEEL BULB

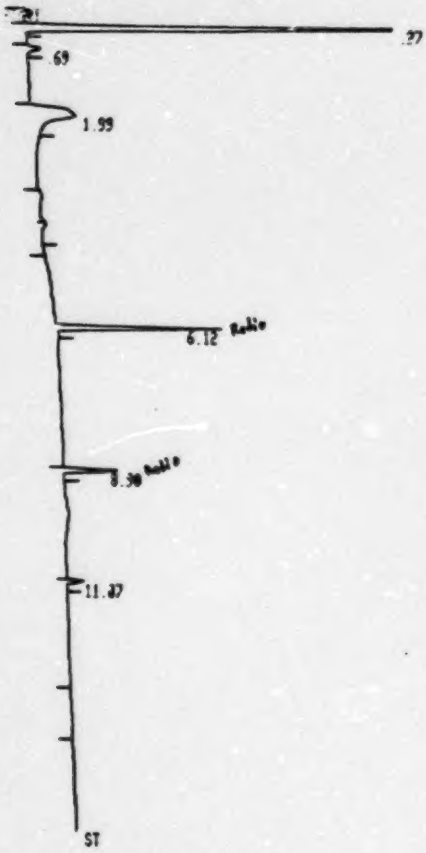
RT	Area	Peak Height	Amount (PPM)	Component
.27	48293		—	N_2
.69	1619		0.4	C_2
1.99	14497		2.5	C_3
6.12				
8.90	RADIO INTERFERENCE			
10.07				

Name of Operator M.D. CHIPS, Date OCT 30 1981

12" in E port

Sample B taken 1248

TP 60 - 160
@ 20°/min



Operator M.D. CHIPS Date 8-12-81
Column No. Length 6' Dia. 1/8"
Coating Concn.
Support PORAPAK Q Mesh 60/80
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS He Rate 60 PSI ~~ml/min.~~
Pressures: Inlet Outlet
Hydrogen 40 PSI ~~ml/min.~~ Air 40 PSI ~~ml/min.~~
DETECTOR E.C. T.C. F.I.D. 4 X 10^{-11}
Scavenger Rate ml/min.
Sens. Rec. Range mv.
SAMPLE 1248 BULB-B Size 2.0 ML
Solvent Concn.

```
RUN #    4                AUG/12/81  13:45:07

AREA%
  RT          AREA TYPE   AR/HT        AREA%
  0.27       48293 D BB   0.078       57.669
  0.69        1619 D PB   0.091        1 933
  1.99       14497   PB   0.273       17.312
  6.12       13912 D PB   0.066       16.613
  8.90        4276 D BB   0.062        5.106
 11.07        1144   BB   0.056        1.366

TOTAL AREA=      83741
MUL FACTOR= 1.0000E+00
```

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK, Job No. 307602.70
BAKERSFIELD, CA

Injection Date 8-12-81, Time 15:45:15, Instrument ID VARIAN 3700
Recorder/Printout Reference No. 5, Recorder ID HP3390A
Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description 1510 BULB-A

GC CONDITIONS

Amount Injected 2.0ml, Inj. Port or Sample Loop Used 2.0ML LOOP
Detector Used: FID X, ECD __, FPD __, TCD __ (Current ____)
Detector Attenuation 4, Amplifier or Range 10^{-11}
Column: Liquid Phase N/A, Solid Phase PORAPAK Q,
Length 6', O.D. 1/8", I.D. ____, Material S.S.
Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C
Temperature Program ISOTHERMAL

SAMPLE RUN

Sampling Method GRAB 500ML STAINLESS STEEL BULB

RT	Area	Peak Height	Amount (PPM)	Component
.27	51112		—	N_2
.68	1649		0.4	C_2
1.89	10351		1.8	C_3
3.52				
↓	RADIO	INTERFERENCE		
6.57				

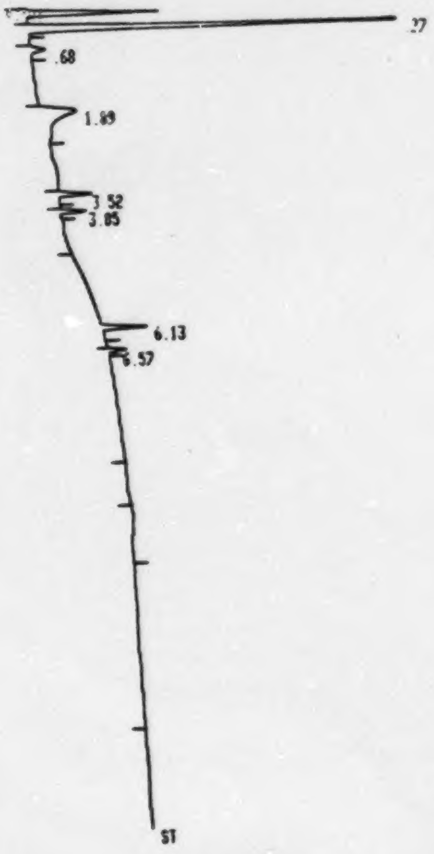
Name of Operator M.D. CHIPS, Date OCT 30 1981

5-122

12" in Ex port

sample A teflon 1510

TP 60 → 160°C
20°C/min



Operator M.D. CHIPS Date 8-12-81
Column No. Length 6' Dia. 1/8"
Coating Concn.
Support PORAPACK Q Mesh 80/80
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 220 °C
CARRIER GAS He Rate 60 PSI ~~ml/min.~~
Pressures: Inlet. Outlet.
Hydrogen 40 PSI ~~ml/min.~~ Air 60 PSI ~~ml/min.~~
DETECTOR E.C. T.C. F.I.D. 4 X 10-11
Scavenger Rate ml/min.
Sens. Rec. Range mv.
SAMPLE 1510 Bulb-A Size 2.0 mL
Solvent Concn.

```
RUN #    5                AUG/12/81  15:45:15

AREA%
  RT            AREA TYPE    AR/HT        AREA%
  0.27         51112 D BB    0.079       67.199
  0.68          1649 D PB    0.069        2.168
  1.89         10351   PB    0.226       13.609
  3.52          2577 D PB    0.063        3.388
  3.85          1897 D BB    0.060        2.494
  6.13          7059   PB    0.117        9.281
  6.57          1416 D BB    0.060        1.862

TOTAL AREA=        76061
MUL FACTOR= 1.0000E+00
```

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA, Job No. 30760270

Injection Date 8-12-81, Time 16:11:29, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 6, Recorder ID HP3390A

Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description 1515 BULB-B

GC CONDITIONS

Amount Injected 2.0ml, Inj. Port or Sample Loop Used 2.0ML LOOP

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ________)

Detector Attenuation 4, Amplifier or Range 10^{-11}

Column: Liquid Phase N/A, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ________, Material S.S.

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

SAMPLE RUN

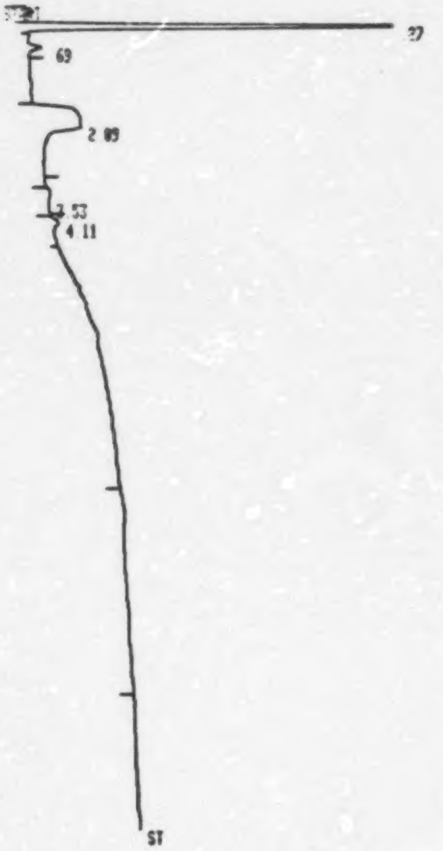
Sampling Method GRAB 500ML STAINLESS STEEL BULB

RT	Area	Peak Height	Amount (PPM)	Component
.27	45557		—	N_2
.69	2093		0.5	C_2
2.09	32492		5.7	C_3
3.53	RADIO		—	—
4.11	1279		0.1	C_4

Name of Operator M.D. CHIPS, Date OCT 30 1981

12" in [illegible]

Sample B taken 1515



Operator M. D. CHIPPS Date 8-12-81
Column No. Length 6' Dia. 1/8"
Coating Concn.
Support PORAPAK Q Mesh 60/80
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS He Rate 60 psi ~~ml/min~~
Pressures: Inlet Outlet
Hydrogen 40 psi ~~ml/min.~~ Air 60 psi ~~ml/min.~~
DETECTOR E.C. T.C. F.I.D. 4 x 10⁻¹¹
Scavenger Rate ml/min.
Sens. Rec.Range mv.
SAMPLE 1515 BVLR-B Size 2.0 mL
Solvent Concn.

```
RUN #    6              AUG/12/81  16:11:29

AREA%
   RT          AREA TYPE   AR/HT        AREA%
  0.27        45557 D BV   0.077       55.250
  0.69         2093 D VB   0.120        2.538
  2.09        32492   PB.  0.541       39.405
  3.53         1035   PB   0.180        1.255
  4.11         1279   PB   0.147        1.551

TOTAL AREA=      82456
MUL FACTOR= 1.0000E+00
```

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA, Job No. 30760270

Injection Date 8-12-81, Time 17:07:48, Instrument ID VARIAN 3700
Recorder/Printout Reference No. 8, Recorder ID HP3390A
Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description BLANK BULB B

GC CONDITIONS

Amount Injected 2.0 ml, Inj. Port or Sample Loop Used 2.0 ML LOOP
Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ________)
Detector Attenuation 4, Amplifier or Range 10^{-11}
Column: Liquid Phase N/A, Solid Phase PORAPAK Q,
Length 6', O.D. 1/8", I.D. ________, Material S.S.
Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C
Temperature Program ISOTHERMAL

SAMPLE RUN

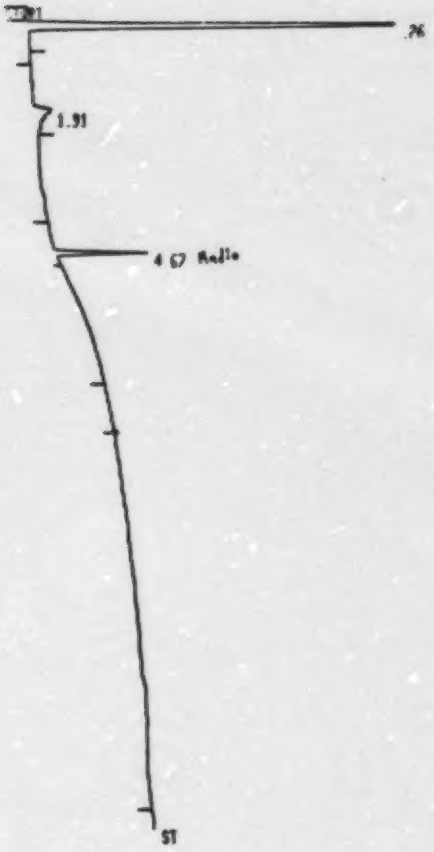
Sampling Method PURGE WITH N_2

RT	Area	Peak Height	Amount (PPM)	Component
.26	55843		—	N_2
1.91	2101		0.3	C_3
4.67	RADIO		—	—

Name of Operator M.D. CHIPS, Date OCT 30 1981

5-126

blank Bulb B
N2 Purge
TP 60→160°C
20°C/min



Operator M.D. CHIPS ..... Date 8-12-81
Column No. .... Length 6' ..... Dia. 1/8"
Coating .... Concn. ....
Support PORAPAK Q .... Mesh 60/80
TEMP: Col: Init .... 120 °C Final 120 .... °C
Rate .... °C/min. Det. 250 °C Inj. 120 .... °C
CARRIER GAS He .... Rate 60psi .... ~~ml./min.~~
Pressures: Inlet .... Outlet ....
Hydrogen 40psi ~~ml./min.~~ Air 60 psi ~~ml./min.~~
DETECTOR E.C. .... T.C. .... F.I.D. 4 x 10-11
Scavenger .... Rate .... ml./min.
Sens. .... Rec.Range .... mv.
SAMPLE BLANK BULB - B .... Size 2.0 ML
Solvent .... Concn ....

```
RUN #    8              AUG/12/81  17:07:40

AREA%
   RT           AREA TYPE    AR/HT       AREA%
  0.26         55843 D PB    0.003      85.223
  1.91          2101   PB    0.113       3.206
  4.67          7582 D PB    0.062      11.571

TOTAL AREA=      65526
MUL FACTOR= 1.0000E+00
```

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA, Job No. 307602.70

Injection Date 8-12-81, Time 17:36:20, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 9, Recorder ID HP3390A

Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description BLANK BULB-A

GC CONDITIONS

Amount Injected 2.0 ml, Inj. Port or Sample Loop Used 2.0 ML LOOP

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ___)

Detector Attenuation 4, Amplifier or Range 10^{-11}

Column: Liquid Phase N/A, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ___, Material S.S.

Temperature: Injector 120 °C, Oven 130 °C, Detector 250 °C

Temperature Program ISOTHERMAL

SAMPLE RUN

Sampling Method PURGE WITH N_2

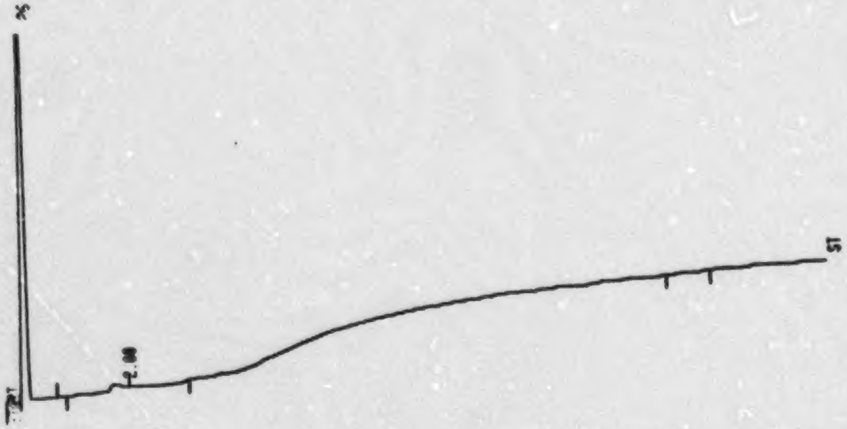
RT	Area	Peak Height	Amount (PPM)	Component
.26	54175			N_2
2.00	-0-			

Name of Operator M.D. CHIPS, Date OCT 30 1981

5-128

Operator M.D. Chips Date 8-12-81
Column No. Length 6' Dia. 1/8"
Coating Concn.
Support Porapak Q Mesh 60/80
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS He Rate 60 psi ~~ml./min.~~
Pressures: Inlet Outlet
Hydrogen 40 psi ~~ml./min.~~ Air 60 psi ~~ml./min.~~
DETECTOR E.C. T.C. F.I.D. 4 x 10-11
Scavenger Rate ml./min.
Sens. Rec. Range mv.
SAMPLE BLANK BULB-A Size 2.0 ML
Solvent Concn.

Blank Bulb A
N2 Purge
TP 60→160°C
20°C/min



```
RUN #    9            AUG/12/81   17:36:20

AREA%
   RT          AREA TYPE    AR/HT      AREA%
   0.26       54175 D BB    0.083    100.000
   2.00           0   PB    0.000      0.000

TOTAL AREA=      54175
MUL FACTOR= 1.0000E+00
```

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA., Job No. 307602.70

Injection Date 8-13-81, Time 14:26:19, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 13, Recorder ID HP3390A

Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description 1305 BULB-A

GC CONDITIONS

Amount Injected 2.0 ml, Inj. Port or Sample Loop Used 2.0 ml LOOP

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current _____)

Detector Attenuation 4, Amplifier or Range 10^{-11}

Column: Liquid Phase _____, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. _____, Material S.S.

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

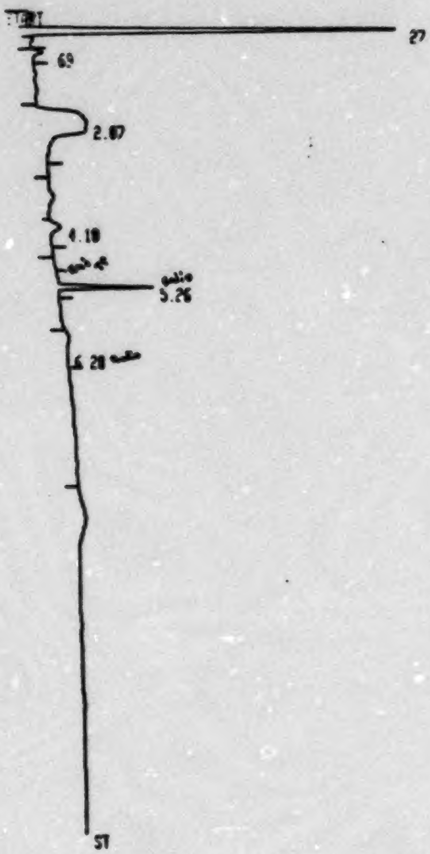
SAMPLE RUN

Sampling Method GRAB 500 ML STAINLESS STEEL BULB

RT	Area	Peak Height	Amount (ppm)	Component
.27	40784		—	N_2
.69	1401		0.3	C_2
2.07	31684		5.4	C_3
4.10	2206		0.2	C_4
5.26	RADIO INTERFERENCE			
6.28				

Name of Operator M. D. CHIPS, Date OCT 30 1981

Sample A [illegible] 1305
10" in E port
TP 50°→ 160°C
20°C/min



Operator M.D. Chies Date 8-13-81
Column No. Length 6' Dia. 1/8"
Coating Concn.
Support PORAPAK Q Mesh 60/80
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS He Rate 60 psi ~~ml./min.~~
Pressures: Inlet Outlet
Hydrogen 40 psi ~~ml./min.~~ Air 60 psi ~~ml./min.~~
DETECTOR E.C. T.C. F.I.D. 4 X 10⁻¹¹
Scavenger Rate ml./min.
Sens. Rec.Range mv.
SAMPLE 1305 BULB-A Size 2.0 ML
Solvent Concn.

```
RUN 0   13              AUG/13/81   14:26:19

AREA%
   RT          AREA TYPE    AR/HT       AREA%
  0.27        40784 D BP    0.076      47.259
  0.69         1401 D BB    0.094       1.623
  2.07        31684   PB    0.516      36.715
  4.10         2206   PB    0.157       2.556
  5.26         8255 D PB    0.070       9.566
  6.28         1968   BB    0.322       2.281

TOTAL AREA=      86298
MUL FACTOR= 1.0000E+00
```

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA., Job No. 307602.70

Injection Date 8-13-81, Time 16:11:26, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 15, Recorder ID HP3390A

Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description 1540 BULB-B

GC CONDITIONS

Amount Injected 2.0ml, Inj. Port or Sample Loop Used 2.0ml LOOP

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ___)

Detector Attenuation 4, Amplifier or Range 10^{-11}

Column: Liquid Phase ___, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ___, Material S.S.

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

SAMPLE RUN

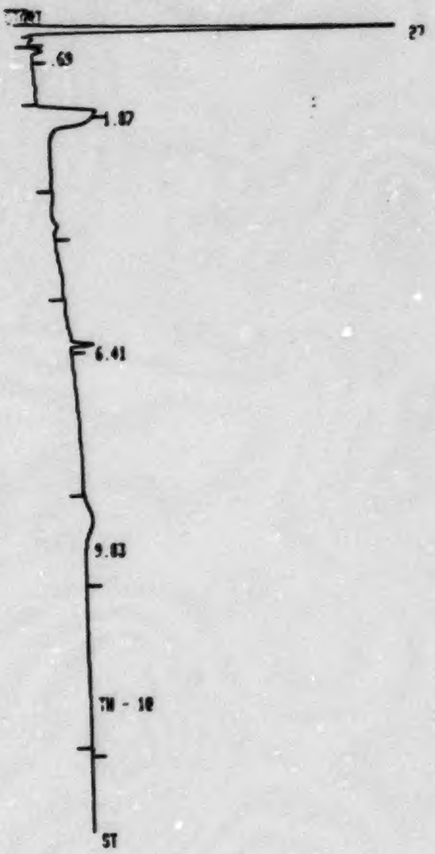
Sampling Method GRAB 500ml S.S. BULB

RT	Area	Peak Height	Amount (ppm)	Component
.27	44162		—	N_2
.69	1466		0.3	C_2
1.87	1656		0.2	C_3
6.41	RMOIO		—	—
9.83	6770		0.5	C_6

Name of Operator M.D. CHIPS, Date OCT 30 1981

5-132

Sample A taken 1540
→ 60→160° 12° in E port
20°/min



```
RUN #   15            AUG/13/81  16:11:26

AREA%
  RT          AREA TYPE    AR/HT       AREA%
  0.27       44162 D BV    0.070      78 159
  0.69        1466 D PB    0.092       2.595
  1.87        1656   PB    0.056       2.931
  6.41        2449 D PB    0.082       4.334
  9.83        6770   BB    0.597      11.982

TOTAL AREA=      56583
MUL FACTOR= 1.0000E+00
```

Operator M. D. CHIPS Date 8-13-81
Column No. Length 6' Dia. 1/8"
Coating Concn.
Support PORAPAK Q Mesh 60/80
TEMP: Col: Init 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS He Rate 60 psi ~~ml./min.~~
Pressures: Inlet Outlet
Hydrogen 40 psi ~~ml./min.~~ Air 60 psi ~~ml./min.~~
DETECTOR E.C. T.C. F.I.D. 4 x 10^{-11}
Scavenger Rate ml./min.
Sens. Rec. Range mv.
SAMPLE 1540 BULB-B Size 2.0 ML
Solvent Concn.

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA., Job No. 307602.70

Injection Date 8-13-81, Time 17:12:03, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 16, Recorder ID HP3390A

Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description 1545 BULB-B

GC CONDITIONS

Amount Injected 2.0 ml, Inj. Port or Sample Loop Used 2.0 ml LOOP

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ______)

Detector Attenuation 4, Amplifier or Range 10^{-11}

Column: Liquid Phase ______, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ______, Material S.S.

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

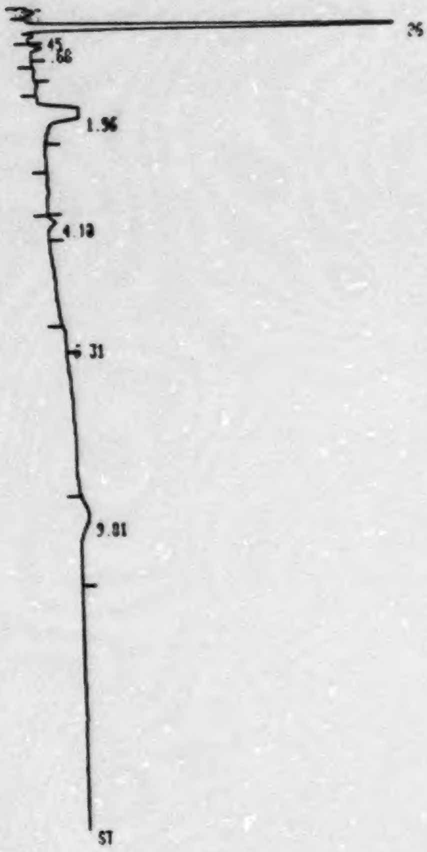
SAMPLE RUN

Sampling Method GRAB 500ML SS BULB

RT	Area	Peak Height	Amount (ppm)	Component
.26	43124		0.3	N_2
.45	450		0.3	C_1
.68	1500		3.0	C_2
1.96	17372		0.1	C_3
4.10	1490		0.1	C_4
6.31	1029		0.5	C_5
9.81	7338			C_6

Name of Operator M.D. CHIPS, Date OCT 30 1981

Sample B Taken 1545
6" in East port



```
RUN #   16                AUG/13/81  17:12:00

AREA%
  RT             AREA TYPE    AR/HT        AREA%
  0.26          43124 D PV    0.070       59.643
  0.45            450 D VB    0.071        0.622
  0.68           1500 D BB    0.092        2.075
  1.96          17372   PB    0.336       24.027
  4.10           1490   BB    0.160        2.061
  6.31           1029   BB    0.296        1.423
  9.81           7338   BB    0.580       10.149

TOTAL AREA=       72303
MUL FACTOR= 1.0000E+00
```

Operator M.D. CHIPS Date 8-13-81
Column No. Length 6' Dia. 1/8"
Coating Concn.
Support PORAPAK Q Mesh 60/80
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS He Rate 60 PSI ~~ml/min.~~
Pressures: Inlet Outlet
Hydrogen 40 PSI ~~ml/min.~~ Air 600 PSI ~~ml/min.~~
DETECTOR E.C. T.C. F.I.D. 4 X 10⁻¹¹
Scavenger Rate ml./min.
Sens. Rec.Range mv.
SAMPLE 1545 BULB-B Size 2.0 ML
Solvent Concn.

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA., Job No. 307602.70

Injection Date 8-13-81, Time 18:25:23, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 17, Recorder ID HP3390A

Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description 1745 BULB-A

GC CONDITIONS

Amount Injected 2.0 ml, Inj. Port or Sample Loop Used 2.0 ml LOOP

Detector Used: FID X, ECD __, FPD __, TCD __ (Current ____)

Detector Attenuation 4, Amplifier or Range 10^{-11}

Column: Liquid Phase ____, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ____, Material S.S.

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

SAMPLE RUN

Sampling Method GRAB 500 cc. S.S. BULB

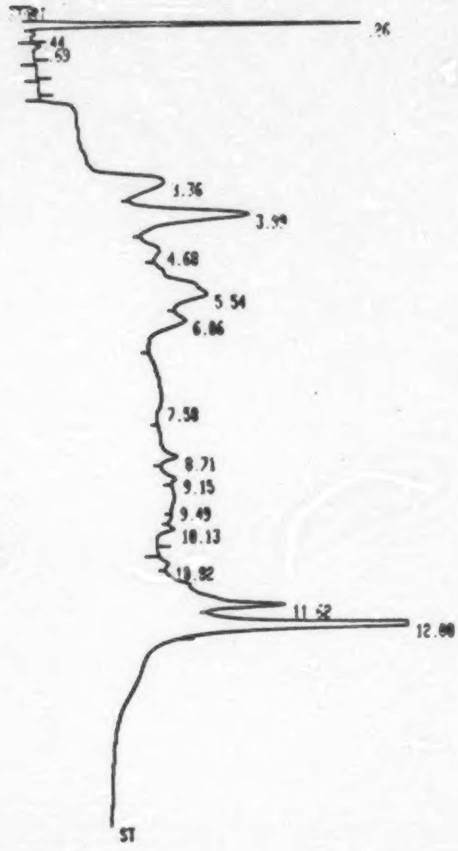
RT	Area	Peak Height	Amount (ppm)	Component
.26	31541		—	N_2
.44	354		.0.2	C_1
.69	965		0.2	C_2
3.36	115120		13.91	C_4
3.99	95916		11.59	C_4
4.68	47083		5.68	C_4
5.54	114960		11.34	C_5

CONTINUED ON NEXT PAGE

Name of Operator M.D. CHIPS, Date OCT 30 1981

RT	Area	Peak Height	Amount (ppm)	Component
6.06	63007		6.21	C_5
7.58	27629		7.66	C_5
8.71	39554		3.16	C_6
9.15	14084		1.12	
9.49	19181		1.53	
10.13	4689		0.37	
10.82	1552		0.12	
11.62	38726		3.09	
12.0	95640		6.64	C_6

Sample A taken 1745
12" in exit port
bulb ≈ 700°F



Operator M.D. SHIPS Date 8-13-81
Column No. Length 6' Dia. 1/8"
Coating Concn.
Support PORAPAK Q Mesh 60/80
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS He Rate 60 psi ~~ml/min.~~
Pressures: Inlet Outlet
Hydrogen 40 psi ml./min. Air 60 psi ~~ml/min.~~
DETECTOR E.C. T.C. F.I.D. 4 x 10-11
Scavenger Rate ml./min.
Sens. Rec. Range mv.
SAMPLE 1745 BULB-A Size 2.0 ML
Solvent Concn.

```
RUN #   17                AUG/13/81   10:25:23

AREA%
   RT           AREA TYPE    AR/HT        AREA%
  0.26         31541 D BV    0.073        4.150
  0.44           354 D VB    0.065        0.047
  0.69           965 D BB    0.089        0.127
  3.36        115120   PV    0.860       15.147
  3.99         95916   VV    0.410       12.620
  4.68         47083   VV    0.448        6.195
  5.54        114960   VV    0.754       15.127
  6.06         63007   VV    0.549        8.290
  7.58         77629   VV    1.361       10.214
  8.71         39554   VV    0.690        5.205
  9.15         14084   VV    0.301        1.853
  9.49         19181   VV    0.487        2.524
 10.13          4689 D VB    0.174        0.617
 10.82          1552   PV    0.151        0.204
 11.62         38726   VV    0.255        5.096
 12.00         95640 D VB    0.119       12.584

 TOTAL AREA=     760000
 MUL FACTOR= 1.0000E+00
```

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA., Job No. 307602.70

Injection Date 8-13-81, Time 18:48:27, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 18, Recorder ID HP3390A

Purpose of Run $C_1 - C_6$ HYDROCARBON ANALYSIS

Sample Description 1745 (REPEAT) BULB-A

GC CONDITIONS

Amount Injected 2.0 ml, Inj. Port or Sample Loop Used 2.0 ml LOOP

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ________)

Detector Attenuation 4, Amplifier or Range 10^{-11}

Column: Liquid Phase ________, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ________, Material S.S.

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

SAMPLE RUN

Sampling Method GRAB 500 ML SS BULB

RT	Area	Peak Height	Amount (PPM)	Component
.26	40822			N_2
.69	4890		1.1	C_2
1.87	74645		12.9	C_3
3.04	12212		1.47	C_4
3.29	16017		1.93	C_4
4.04	10611		1.28	C_4
5.10	8830		1.06	C_4

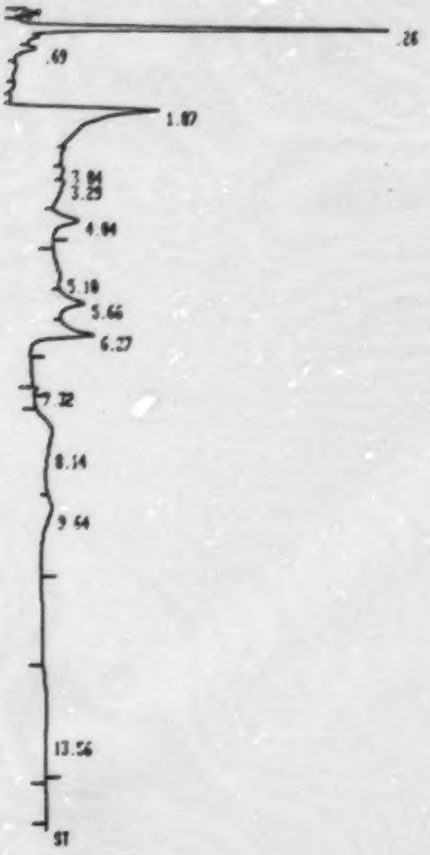
CONTINUED ON NEXT PAGE

Name of Operator M.D. CHIPS, Date OCT 30 1981

RT	Area	Peak Height	Amount (ppm)	Component
5.66	20860		2.05	C_5
6.27	20366		2.01	C_5
7.32	328		0.03	C_5
8.14	19844		1.58	C_6
9.64	15848		1.26	C_6
13.56	3567		2.8	as CH_4

5-140

Sample A Repeat
T° 60-316°C 20°/min
Bulb 2 12/F



Operator M.D. CHIPS Date 8-13-81
Column No. Length 6' Dia. 1/8"
Coating Concn.
Support PORAPAK Q Mesh 60/80
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 120 °C
CARRIER GAS He Rate 60 psi ~~ml./min.~~
Pressures: Inlet Outlet
Hydrogen 40 psi ~~ml./min.~~ Air 60 psi ~~ml./min.~~
DETECTOR E.C. T.C. F.I.D. 4x10⁻¹¹
Scavenger Rate ml./min.
Sens. Rec.Range mv.
SAMPLE 1745 (REPEAT) BULB-A Size 2.0 ML
Solvent Concn.

```
RUN #   18                 AUG/13/01  18:48:27

AREA%
   RT           AREA TYPE     AR/HT        AREA%
  0.26         40822 D BV     0.083       16.405
  0.69          4890 D VV     0.152        1.965
  1.87         74645   PV     0.302       29.997
  3.04         12212   VV     0.279        4.908
  3.29         16017 D VV     0.410        6.437
  4.04         10611   VB     0.259        4.264
  5.18          8830   BV     0.492        3.549
  5.66         20860   VV     0.361        8.383
  6.27         20366   VB     0 261        9.184
  7.32           328 D BB     0.062        0.132
  8.14         19844   BV     0.906        7.975
  9.64         15848   VB     0.905        6.369
 13.56          3567   PB     1.000        1.434

TOTAL AREA=     248840
MUL FACTOR= 1.0000E+00
```

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA., Job No. 307602.70

Injection Date 8-13-81, Time 19-11-44, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 19, Recorder ID HP3390A

Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description 1750 BULB-B

GC CONDITIONS

Amount Injected 2.0ml, Inj. Port or Sample Loop Used 2.0ml LOOP

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ________)

Detector Attenuation 4, Amplifier or Range 10^{-11}

Column: Liquid Phase ________________, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ________, Material S.S.

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

SAMPLE RUN

Sampling Method GRAB 500ml SS. BULB

RT	Area	Peak Height	Amount (ppm)	Component
.26	40313		—	N_2
.44	5312		4.1	C_1
.69	5902		1.4	C_2
1.88	26935		4.6	C_3
4.06	2944		0.3	C_4
6.24	18164		1.79	C_5
7.73	27140		2.16	C_6
8.91	61942		4.95	C_6

Name of Operator M.D. CHIPS, Date OCT 30 1981

Sample B taken 1750
12" in East port

```
ATT 2↑  7
ESCAPE

LIST: ATT 2↑ =  0
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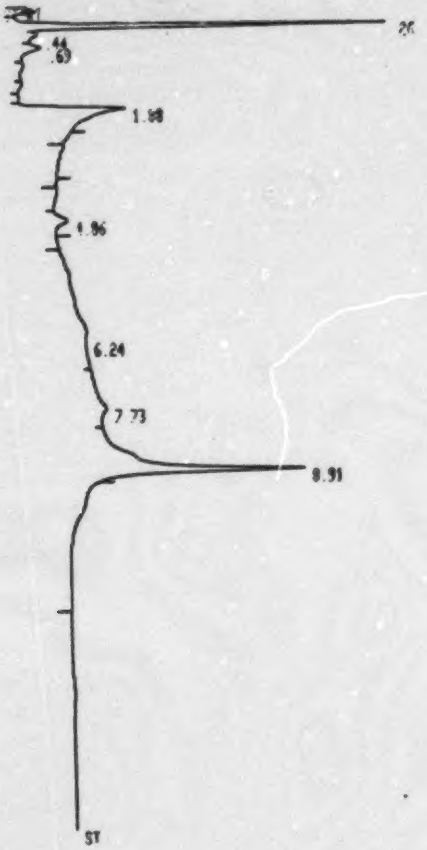


```
RUN 0   19            AUG/13/81  19:11:44

AKEA%
  RT            AREA TYPE   AR/HT        AREA%
 0.26          40313 D BV   0.081       21.368
 0.44           5312 D VV   0.178        2.816
 0.69           5902 D VV   0.171        3.128
 1.88          26935   PB   0.217       14.277
 4.06           2944   PB   0.168        1.561
 6.24          18164   BV   0.993        9 628
 7.73          27140   VV   0.962       14.386
 8.91          61947   VB   0.225       32..836

TOTAL AREA=      188660
MUL FACTOR= 1.0000E+00
```

Operator M.D. SMiPS Date 8-13-81
Column No. Length 6' Dia. 1/8"
Coating Concn. Mesh 60/80
Support PORAPAK Q
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 130 °C
CARRIER GAS He Rate 60 psi ~~ml/min.~~
Pressures: Inlet Outlet
Hydrogen 20 psi ~~ml/min.~~ Air 60 psi ~~ml/min.~~
DETECTOR E.C. T.C. F.I.D. 4 x 10-11
Scavenger Rate ml/min.
Sens. Rec.Range mv.
SAMPLE 1750 BULD- B Size 2.0 mL
Solvent Concn.

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK, Job No. 307602.70
BAKERSFIELD, CA.

Injection Date 8-13-81, Time 19:38:45, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 20, Recorder ID HP3390A

Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description BLANK BULB-A

GC CONDITIONS

Amount Injected 2.0 ml, Inj. Port or Sample Loop Used 2.0 ml LOOP

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ________)

Detector Attenuation 4, Amplifier or Range 10^{-11}

Column: Liquid Phase ____________, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ________, Material S.S.

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

SAMPLE RUN

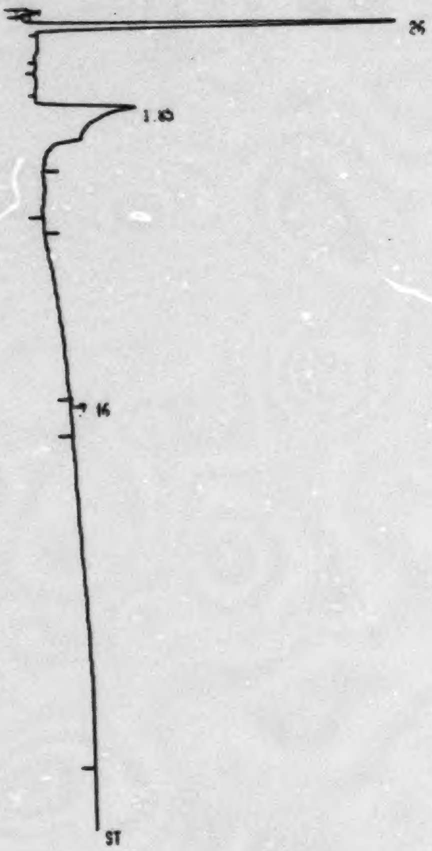
Sampling Method PURGE WITH N_2

RT	Area	Peak Height	Amount (ppm)	Component
.26	47909		—	N_2
1.85	61212		10.5	C_3
7.46	83		0.008	C_5

Name of Operator M.D. CHIPS, Date OCT 30 1981

5-144

Blank bulb A
N_2 purge 950°C



Operator M.D. Chips Date 8-13-81
Column No. Length 6' Dia. 1/8 "
Coating Concn.
Support PORAPAK Q Mesh 80/100
TEMP: Col: Init. 120 °C Final 120 °C
Rate °C/min. Det. 250 °C Inj. 220 °C
CARRIER GAS He Rate 60 psi ~~ml/min.~~
Pressures: Inlet Outlet
Hydrogen 40 psi ~~ml/min.~~ Air 60 psi ~~ml/min.~~
DETECTOR E.C. T.C. F.I.D. 4 x 10⁻¹¹
Scavenger Rate ml./min.
Sens. Rec.Range mv.
SAMPLE BLANK BULB-A Size 2.0ML
Solvent Concn.

```
RUN #   20                 AUG/13/81  19:38:45

AREA%
  RT          AREA TYPE   AR/HT      AREA%
  0.26       47909 D BV   0.004     43.871
  1.85       61212   VB   0.464     56.053
  7.46          83 D BB   0.021      0.076

TOTAL AREA=      109200
MUL FACTOR= 1.0000E+00
```

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client CMEA, Location MOHAWK BAKERSFIELD, CA., Job No. 307602.70

Injection Date 8-13-81, Time 20:05:56, Instrument ID VARIAN 3700

Recorder/Printout Reference No. 21, Recorder ID HP3390A

Purpose of Run C_1-C_6 HYDROCARBON ANALYSIS

Sample Description BLANK BULB-B

GC CONDITIONS

Amount Injected 2.0ml, Inj. Port or Sample Loop Used 2.0ml LOOP

Detector Used: FID X, ECD ___, FPD ___, TCD ___ (Current ______)

Detector Attenuation 4, Amplifier or Range 10^{-11}

Column: Liquid Phase ______, Solid Phase PORAPAK Q,

Length 6', O.D. 1/8", I.D. ______, Material S.S.

Temperature: Injector 120 °C, Oven 120 °C, Detector 250 °C

Temperature Program ISOTHERMAL

SAMPLE RUN

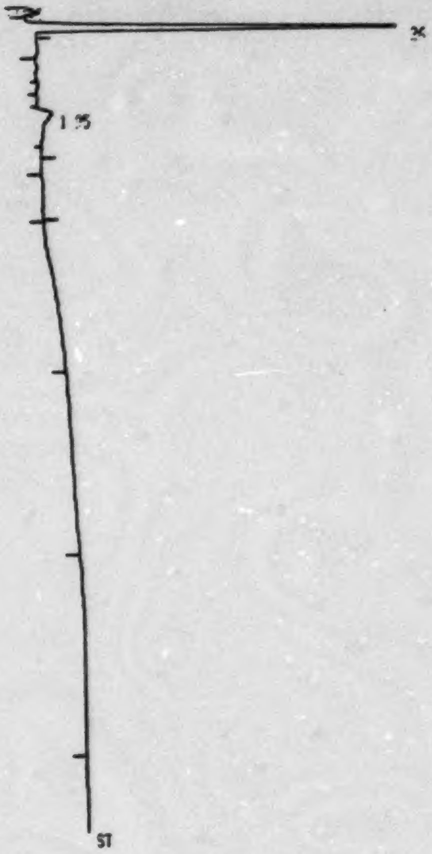
Sampling Method PURGE WITH N_2

RT	Area	Peak Height	Amount (ppm)	Component
.26	47419		—	N_2
1.95	5519		.9	C_3

Name of Operator M.D. Chips, Date Oct 30 1981

5-146

Blank Bulb B 360°C
N_2 Purged



Operator M. D. CHIPS Date 8-13-81
Column No. Length 6' Dia. 1/8"
Coating Concn.
Support PORAPACK Q Mesh 60/80
TEMP: Col: Init. °C Final °C
Rate °C/min. Det. °C Inj. °C
CARRIER GAS Rate ml./min.
Pressures: Inlet Outlet
Hydrogen ml./min. Air ml./min.
DETECTOR E.C. T.C. F.I.D. 4X10^{-11}
Scavenger Rate ml./min.
Sens. Rec. Range mv.
SAMPLE BLANK BULB-B Size 2.0ML
Solvent Concn.

```
RUN #   21             AUG/13/81  20:05:56

AREA%
   RT            AREA TYPE    AR/HT        AREA%
  0.26          47419 D PB    0.004       89.575
  1.95           5519   PV    0.306       10.425

TOTAL AREA=       52938
MUL FACTOR= 1.0000E+00
```

5.10 RADIOMETRIC ANALYSES RESULTS

SAFETY SPECIALISTS, Inc.
1609-B Regatta Lane • San Jose, California 95112 • Telephone (408) 988-1111

ASSAY REPORT

Acurex Corporation
485 Clyde Avenue
Mountain View, California 94042

Attn: Ms. Linda Bohannon M/S 0-1212

Date: July 20, 1982

Date Samples Received: 11/11/81

Customer Order No.: RB59185A, Rel. 20

SSI No.	Client Description	Activity* Gross Alpha pCi/liter
81388		
D	No. 4, 478 Mohawk Filter, Blank	24 ± 19
E	No. 5, 485, Mohawk 1 Filter	23 ± 18
F	No. 6, 493, Mohawk 2 filter	165 ± 39

REC'D JUL 28 1982

Analyst: Kurt Rohrs

Approved: Steve Bell, Director
Safety and Health Services Division

*The ± values are the two sigma Poisson standard deviation of the counting error.
The ≤ values are equal to or less than three sigma of the counting error.

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SAFETY SPECIALISTS, Inc.
3194 De La Cruz Blvd., Suite 15 • Santa Clara, California 95050 • Telephone (408) 988-1111

ASSAY REPORT

Acurex Corporation
485 Clyde Avenue
Attn: Ms. Linda Bohannon, M/S 0-1212
Mountain View, California 94042

Date: December 28, 1981

Date Samples Received: 11/11/81

Customer Order No. RB59185A, Rel. 20

SSI No.	Client Description	Activity* Gross Beta pCi/Filter	Activity* Gross Gamma pCi/Filter
81388			
D	#4, 478, Mohawk Filter Blank	130.8 ± 5.8	≤ 142
E	#5, 485, Mohawk 1 Filter	133.6 ± 7.9	≤ 145
F	#6, 493, Mohawk 2 Filter	108.2 ± 47.8	≤ 145

NOTE: Gross Alpha results will be reported at a later date.

Fariba Danesh
Analyst: Fariba Danesh

Approved: T. C. Noble, Director
Safety & Health Services Division

*The ± values are the two sigma Poisson standard deviation of the counting error.
The ≤ values are equal to or less than three sigma of the counting error.

5.11 BIOLOGICAL ASSAY RESULTS

cc: L. Waterland

FILE

Litton BIONETICS

5516 Nicholson Lane, Kensington, Maryland 20895 301 881-5600 • Telex 89-8369

March 26, 1982

Mr. Roy A. Belletto
Acurex Corporation
485 Clyde Avenue
Mountain View, California 94042

RE: Acurex Subcontract No. RB59178A, Release No. 4

Dear Mr. Belletto:

Enclosed are five bound, and one unbound, copies of the final reports for the four XAD resin extract samples submitted for testing and evaluation in IERL-EPA Level 1 Ames/*Salmonella* mutagenesis and CHO cytotoxicity bioassays. All studies were conducted and evaluated under IERL-EPA Level 1 guidelines.

Interpretative problems were encountered with the Mohawk 1 and Mohawk 2 samples because the amount of the XAD extracts was insufficient to assay up to the recommended maximum applicable dose (MAD) based upon weight of organics per plate. Ames testing was modified by eliminating less responsive tester strains. The ranking of the samples, the criteria used to evaluate the results, and the critical data upon which the evaluations were based are summarized in the three attached tables.

If you have any questions or comments concerning the reports, please feel free to contact me at (301) 881-5600, extension 536.

Sincerely,

LITTON BIONETICS, INC.

Robert Young

Robert R. Young
Environmental Assessment Section
Department of Molecular Toxicology

RRY/dc

Enclosures: Ames and CHO 6153-6156 Reports.

cc: Contracts, LBI No. 22064, Mod. 4.

TABLE 1

BIOASSAY SUMMARY TABLE

Technical Directive or Project No. LBI Project No. 22064

Contract No. EPA No. 68-02-3188; Acurex Subcontract No. RB59178A, Release No.4.

	Health Effects Tests				Ecological Effects Tests									
					Aquatic						Terrestrial			
					Fresh Water			Marine						
Sample Identification	AMES Salmonella[a]	RAM Cytotoxicity	CHO Cytotoxicity	Rodent Toxicity	Fish	Invertebrate	Algal	Fish	Invertebrate	Algal	Plant Stress Ethylene	Root Elongation	Insect Toxicity	Notes
TOSCO 2 XAD + DMC A81-07-011-562,569	M		M											
TOSCO 1 XAD A81-07-011-509	M		M											
MOHAWK 1 XAD A81-09-007-488	M		U[b]											
MOHAWK 2 XAD A81-09-007-495	U[b]		U[b]											

[a] = Ames evaluations are based upon mutagenicity and not toxicity

[b] = Test results could not be evaluated and ranked because of insufficient sample. Test results indicate moderate (M) toxicity (mutagenicity) or less.

ND = No Detectable Toxicity
L = Low Toxicity
M = Moderate Toxicity
H = High Toxicity
U = Undetermined because of insufficient sample

TABLE 2

DEFINITION OF TOXICITY CATEGORIES FOR HEALTH EFFECTS ASSAYS

Assay[a]	Activity Measured[b]	Sample Type[c]	MAD[d]	Units	Range of Concentration or Dosage			
					High	Moderate	Low	Not Detectable (ND)
Ames	MEC (mutagenesis)	S	5	mg/plate	<0.05	0.05-0.5	0.5-5	ND at >5
		AL,NAL	200	µl/plate	<2	2-20	20-200	ND at >200
		E	5000	L/plate	<50	50-500	500-5000	ND at >5000
RAM	EC_{50} (lethality)	S	1	mg/ml	<0.01	0.01-0.1	0.1-1	ND at >1
		AL	600	µl/ml	<6	6-60	60-600	ND at >600
		NAL	20	µl/ml	<0.2	0.2-2	2-20	ND at >20
		E	1000	L/ml	<10	10-100	100-1000	ND at >1000
CHO	EC_{50} (lethality)	S	1	mg/ml	<0.01	0.01-0.1	0.1-1	ND at >1
		AL	600	µl/ml	<6	6-60	60-600	ND at >600
		NAL	20	µl/ml	<0.2	0.2-2	2-20	ND at >20
		E	1000	L/ml	<10	10-100	100-1000	ND at >1000
WAT	LD_{50} (lethality and toxic signs)	S	5	gm/kg	<0.05	0.05-0.5	0.5-5	ND at >5
		AL,NAL	5	ml/kg	<0.05	0.05-0.5	0.5-5	ND at >5

[a] Standard test abbreviations are as follows:
Ames: Ames *Salmonella*/microsome mutagenesis assay
RAM: Rabbit alveolar macrophage cytotoxicity assay
CHO: Rodent cell clonal toxicity assay
WAT: Acute *in vivo* test in rodents (whole animal test)

[b] Standard abbreviations for measured endpoints are as follows:
MEC: Minimum effective concentration
EC_{50}: Calculated concentration expected to produce effect in 50 percent of population
LD_{50}: Calculated dose expected to kill 50 percent of population

[c] S = Solid, AL = Aqueous liquid, NAL = Nonaqueous liquid, E = Extract and/or concentrate of unknown organic content (use equivalent volume of SASS train gas)

[d] MAD = Maximum applicable dose

TABLE 3

HEALTH EFFECTS CRITICAL DATA SUMMARY FORM[a]

Contract No. EPA No. 68-02-3188 **Technical Directive or Project No.** LBI No. 22064 **Site Sampled** XAD Resin Extracts
Acurex Subcontract No. RB59178A
Release No. 4

Sample Identification	Ames Mutagenicity [MEC][b]	CHO Clonal Toxicity [EC_{50}][c]	RAM Cytotoxicity [EC50][c] Viability	Viability Index	ATP	ATP/Per 10^6 Cells	Rodent Toxicity LD_{50}[d]	Toxic Signs[e]
TOSCO 2 XAD + OMC	30 μg[f]	70.8 μg						
(A81-07-011-662,559)								
TOSCO 1 XAD	85 μg	37.4 μg						
(A81-07-011-459)								
MOHAWK 1 XAD	75 μg	>60 μg						
(A81-09-007-488)								
MOHAWK 2 XAD	>100 μg	>40 μg						
(A81-09-007-495)								

[a] The assays, observed parameters and evaluation criteria are presented in IERL-RTP Procedures Manual; Level 1 Environmental Assessment Biological Tests, [EPA Contract No. 68-02-2681, Litton Bionetics, Inc., Kensington, Md., September 1980, in press.]

[b] MEC: Minimum Effective Concentration - Lowest concentration for any tester strain giving a mutagenic response.

[c] EC_{50}: Effective concentration that reduces the observed parameter to 50 percent of the appropriate negative control.

[d] LD_{50}: The dose lethal to 50 percent of treated animals.

[e] Toxic signs are identified in a numbered list in the Level 1 manual. Only the number is reported here.

[f] Concentrations are per plate for the Ames assay and per milliliter of culture medium for the CHO assay.

LBI-0798 1/81